

Leonardo da Vinci

Artist

Scientist

Inventor

SIMONA CREMANTE

Leonardo da Vinci

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INTRODUCTION

A category of books that has, strangely enough, not yet received due recognition for the role it continues to play in the critical exegesis of Leonardo – to which it belongs and contributes – is that of the small monograph addressed to a public that is vast and varied, and always hurried, as in the daily and periodical press. In the nineteenth century, that was the preferred public of publishers such as Sonzogno, Motta and Agnelli who did not hesitate to accompany their epic editions of classic and popular authors – involving the participation of the most eminent scholars of the moment and with fascinating illustrations by the great engravers then in vogue (as exemplified by Gustave Doré) – with an abundant production of low-cost booklets, addressed to “the studious youth”, a polite euphemism for ingratiating and thus reaching a public that was increasingly lively and demanding; a public of limited means at the beginning, but nonetheless ready to face the challenges of a society then renewing itself under the stimulus of the great heroes of history and culture, also on the international level. It was

Woman standing near a stream
(*Pointing Lady*), c. 1518;
Windsor Castle, Royal Library.

thus a fresh, exuberant public that guaranteed a certain success, fully justifying the commitment of the publishers of the day in products that were, so to speak, popular, suitable for mass divulgement and as such addressed also to a public of adults who, curious to an extreme, would find in them the magic formula for remaining young.

This methodical process, which lasted for over a century, having gone beyond the initial stage that might be termed romantic, as well the already sophisticated one occurring at the threshold of the third millennium, is engaging now to adapt to the new developments and wiles of mass communication and the globalization of cultures. The bright young men and women of today, unlike those of the past, can afford even the most expensive tools of research. Consequently, divulging has made a great leap forward in quality. We are thus faced with what may seem a paradox. High specialization is no longer lowered to the level of divulging, but the latter has instead been raised to the level of scientific commitment. When we speak of the "hordes of tourists" who invade museums and who, in a good percentage, render profitable the activity of the bookshops, it is unjustifiable to believe that the publications destined to them should be

*Facing busts of old man
and adolescent boy,*

c. 1490-1495;

Florence, Gabinetto dei Disegni
e delle Stampe degli Uffizi.



based only on the principle of rapid, summary information, to the point of tolerating trivial anecdotes or, worse still, common-places kept alive by banal conversations in clubs, salons and even coffee bars. The public of tourists is also, and still today, that of the traditional wealthy aristocrats and those of the mind who, in a now distant past, programmed their grand tours in the Bel Paese with great care and discernment. The tourist of today, even the occasional one who puts his trust in the programmed guidance of the mass media, is always interested in a fine book that can be purchased at a decent price as souvenir of an ineffable experience of the spirit and the intellect. And in this at least, considering the due scale of proportions, he can feel himself on the same level as Goethe, Schiller, Shelley or Byron. Such is then the origin of this excellent book by Simona Cremante, which in a thorough and brilliant synthesis has brought together everything that the public at large expects to know about Leonardo, from his few but sublime paintings, to his marvelous drawings, to his extraordinary manuscripts. This is a book, in fact, that even the narrower public of specialists can appreciate as a practical, reliable tool of consultation. But above all it is a book in which a singular exercise in brevity revives a virtue inspired by the supreme moments of ancient poetry, when a great deal was expressed in a few words. From this concept comes a catalogue description such as that of the Mona Lisa. The book is a product of refined taste also as regards the graphic project and the impeccable quality of its reproductions, and as such is destined to a sophisticated public made increasingly aware by the daily press of the need to be informed; a problematical public, but never to be underestimated, such as the one

that encounters Leonardo for the first time through a world-wide best-seller the like of Dan Brown's The Da Vinci Code and wants to know more, wants to know the temperament and the innermost recesses of the artist's subconscious even beyond the limits reached by Freud. And wants to know, above all, if Leonardo was really the Gran Maestro of a secret society of heretical inkling.

The great interpreters of Leonardo's thought and feelings in the last one hundred and fifty years have always avoided facing headlong the problem of the relationship between Leonardo and his art with religion. It is a disturbing, if not to say thorny problem, insistently dated back to Vasari, who in the first edition of his Lives, published in 1550, states, "And many were his whims, that philosophizing on natural things, attempting to understand the properties of herbs, and constantly observing the motions of the sky, the course of the moon and the behavior of the sun. For all of which, he formulated in his soul a concept so heretical, that it was far from any religion, reckoning himself to be more a philosopher than a Christian." In the second edition, published in 1568, in the midst of the Catholic reform movement, this last sentence was simply suppressed, although the final statement in the Life of Leonardo was retained as proof of a sort of conversion of the artist on his deathbed, when "recounting his misfortunes and the events involved in it, he showed how deeply he had offended God and the world of men, by not having worked in art as he should have." As if to say that Leonardo's art could not be considered sacred art.

This is of course the wrong conclusion. Only in recent times has quite different historical testimony emerged, that of the

Milanese Giovan Paolo Lomazzo, who in 1560 wrote a book modeled on Lucian's Dialogue of the Dead called the Libro dei sogni (Book of Dreams), a manuscript belonging to the British Museum but published only in 1973. One of the personages evoked is Leonardo, shown engaged in dialogue with Phydias. It does not surprise us that Lomazzo is able to have him say new things on his life and work, since he could gather first-hand information directly from Leonardo's still living pupils. "Thus I hope to say," and this is Leonardo himself speaking through the words of Lomazzo, "that in movements and drawing I was so perfect as regards the things of religion, that many people were moved to inspiration by the figures that I had drawn before they were then painted by my creati [that is, by my pupils]." He then specifies that "among them were those of the Last Supper in the Refectory of Santa Maria delle Grazie in Milan, which are so divinely varied, and of such grievous faces, according to the success of their term, that nothing more, I believe, can be conceded to a painter, and thus with many other figures that are now in France and diverse other places."

This extraordinary self-characterization of Leonardo, transmitted in the vivid style of Lomazzo, finds confirmation in the

Study for the Apostle James the Greater in the 'Last Supper' and architectural sketches, c. 1495; Windsor Castle, Royal Library.



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writings of Leonardo himself. And in fact, on a sheet in Windsor containing the study for the head of one of the Apostles in the Last Supper, the following words appear, "When you make your figure consider well what it is and what you want it to do, and be sure that the work reflects the intention and the purpose." This is a reminder to himself that is reiterated in almost the same words on a sheet in the Codex Atlanticus from that time: "Painting. Ensure that the work resembles the intent and the purpose, that is, when you make your figure, consider well what it is and what you want it to do." Clearly, Leonardo is reflecting here a famous advice in Dante's *Convivio*, which he transcribes in a manuscript dating from this time: "He who paints a figure, \ if he cannot be that figure he cannot paint it." And so the painter is like an actor who must identify himself with the personage to be interpreted. He must "learn the part" in order to make himself convincing, just as the painter is obliged to make himself "perfect in the things of religion." Only in this way will the character impersonated – in this case the painted figure – be able to attract the spectator, or even, as we would say today in the case of politicians, to magnetize a crowd. (There springs to mind Vasari, who describes the occasion when

Study for mechanical wing,
c. 1493-1495;
Milan, *Codex Atlanticus*, f. 844r.



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Leonardo's Saint Anne cartoon was exhibited in Florence in 1501: "When it was finished, in the room where it was displayed men and women, young and old, flocked to see it as if they were going to a solemn festival, to gaze upon the marvels of Leonardo, which amazed the entire populace.") For Leonardo – and again it is Lomazzo who has him say it – all this derives from drawings, as if to say from the idea or the concept, which can be transposed into painting by the pupils, the creati, who are the creations of the master – exactly as Raphael, twenty years later, was to do in decorating the Vatican Stanze. But there is still more. All of this has been confirmed by no less than the immense commentary of Alessandro Vellutello to Petrarch's Canzoniere published for the first time in 1535. Vellutello frequented the court of Pope Leo X just at the time when Leonardo was there as the guest of Giuliano de' Medici, the Pope's brother, and when Raphael and his assistants were engaged in the project for decorating the Vatican Stanze according to the iconographic programs of the humanists in residence. And here is what we read in Vellutello's comment to the sonnet, "In what part of the sky, in what idea \ Was the example; from which nature took \ that fine gracious face..." "And in what idea", in connection with Plato's belief that the images of things were all created in the beginning by the Divine mind, since the Idea is that image of a thing which is formed before we undertake to do it, as for the figure, Leonardo Vinci wants to imagine the Virgin Mary, but before he sets his hand to his work, he has established in his mind what size and what actions and dress and what features he wishes her to have..." Observing the faces of Leonardo's Madonnas, who can still doubt that he has

taken the idea expressly from Petrarch's Hymn to the Virgin? Who can still doubt that he had always present before him Dante's advice: "He who paints a figure, if he cannot be that figure he cannot paint it"?

Leonardo the painter is thus capable of being both actor and director, and as the cinema teaches us, an actor or director who interprets a great religious personage or a great religious subject may not necessarily be religious himself. And so there is also room for those who continue to maintain that Leonardo was not religious. Their argument is a testimony as disturbing as that of Vasari. It is based on no less than a text by Leonardo himself. On a sheet of anatomical studies at Windsor dating from 1510 Leonardo – then approaching the age of sixty – defines the human body as an admirable machine invented by Nature, which instills into it "the soul of which the body is the container, that is, the soul of the mother, who first composes in her womb the figure of the man and in due time awakens the soul of which it is the inhabitant, which before remained sleeping and protected by his mother's soul." Having elaborated the idea of this singular process of filiation of souls (hinted at by him already around 1493: "Avicenna contends that the soul gives birth to the soul, and the body to the body and every other member"), Leonardo concludes with a confession that has become famous: "This discourse does not belong here, but concerns the composition of animated bodies. And the rest of the definition of the soul I will leave to the minds of the friars, fathers of the people, who by inspiration know all of the secrets." To which he immediately added, "Leave the crowned letters alone, because they are the highest truth." It may be thought, as it has been for

the most part, that Leonardo intended here to scorn the theologians and their idea of the soul, but his pronouncement in another coeval text on an anatomical sheet also at Windsor, also from 1510, arouses quite some doubts: "And you, O man, who will discern in this work of mine the wonderful works of Nature, if you think it would be a criminal thing to destroy it, reflect how much more criminal is to take the life of a man; and if this, his external form, appears to thee marvelously constructed, remember that it is nothing as compared with the soul that dwells in that structure; and truly, whatever it may be, it is a thing divine, so let it dwell in its work in peace, and do not let your rage or malice destroy such a life."

In this definition of the soul – "whatever it may be, it is a thing divine" – and in the respect for "such a life", lies all of the religion of Leonardo. And it is by no means little.

Carlo Pedretti

*Study for fusing the horse
for the 'Equestrian Monument
to Francesco Sforza', 1491;
Madrid, Ms II, f. 157r.*

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View of Vinci (Florence),
birthplace of Leonardo.

The artist's life

Vinci. Leonardo was born in 1452 in Vinci, a little town on the hills not far from Florence, and the appellative “da Vinci” was not merely an indication of his birthplace but was also his family’s surname. The first document in which Leonardo is mentioned is a “memorandum” written by his paternal grandfather Antonio da Vinci who, as was the custom of the time, meticulously recorded the date and hour of his grandson’s birth on the last page of an old family book: “1452. A grandson was born to me, the son of my son Ser Piero, on the day of April 15, a Saturday, at the third hour of the night. He was named Lionardo.” The mother’s name was not mentioned. Leonardo was an illegitimate child, born out of wedlock, and was raised in the home of his paternal grandparents. Ser Piero, his father, practiced the profession of notary in Florence, where members of the da Vinci family had been notaries for generations, since the time of Dante. In an official document, the child’s grandfather Antonio reported to the Land Office the presence in his home of “Leonardo son of the aforesaid Ser Piero, not legitimate, born of him and of Chaterina.” This was, then, the name of Leonardo’s mother, whose identity is still today mysterious. She may have been a peasant woman, or perhaps a girl from an important family, now fallen in rank, as is suggested by the words of one of Leonardo’s earliest biographers, “He came of good blood on his mother’s side.” Although he was not raised by his mother, Leonardo must

have retained some ties with her considering that, when already forty years old and living in Milan, he took her into his home ("Caterina came on July 16, 1493") and kept her with him for two years, until the time of her death ("Expenses for burying Caterina", he was to note in his papers).

Florence. In 1468, at the age of sixteen, Leonardo left Vinci to join his father in Florence; by this time he must already have given proof of his talent for drawing. Vasari reports in fact that, "He (Ser Piero) took one day some of Leonardo's drawings and brought them to Andrea del Verrocchio, who was a good friend of his, and urged him to say whether Leonardo would profit by studying drawing. Andrea was amazed when he saw Leonardo's extraordinary beginnings..." The young Leonardo thus became an apprentice in Verrocchio's workshop, one of the most flourishing of the day, which received important commissions even from the powerful Medici family. Leonardo's training at this time consisted of acquiring a wide range of skills, not only in the field of painting and sculpture but also in the new technical and scientific conquests that were a vital factor in the flower-

House of Leonardo
at Anchiano
(near Vinci, Florence).

Seal of the Town of Vinci
(14th century); Florence,
Museo Nazionale del Bargello.

ing of the Florentine Renaissance. The Florence of Leonardo's youth was, in fact, pervaded by the concepts of Brunelleschi, who had established the principles of linear perspective and had raised the cupola over the Duomo without reinforcement. And the great copper sphere that was placed atop the marble lantern in 1472 to complete Brunelleschi's dome was fabricated in Verrocchio's workshop. In Rome, over forty years later, the memory of this feat was still vivid in Leonardo's mind as he endeavored to solve the problem of constructing burning mirrors. To assemble the parts, he reminded himself of the technique used in the workshop of his apprenticeship: "Remember the welds that were used to join the ball over Santa Maria del Fiore."

Training with Leonardo in Verrocchio's workshop were other young painters destined to become some of the greatest artists of the late 15th and early 16th centuries: Sandro Botticelli, Perugino, Lorenzo di Credi and Domenico Ghirlandaio (in whose workshop the young Michelangelo was later to serve his apprenticeship). The learning methods were based on drawing from models, copying from antique works of art, rendering the effects of light and shadow and studying drapery. Vasari remarks on how greatly Leonardo was interested from the start in "painting from nature" and "making models of clay figures." At this time he was refining the tools at his disposal for practicing observation of natural life and was beginning to formulate, as in "some heads of women who are laughing", what he was later to describe as "*moti mentali*", or "motions of the mind."

By 1472 Leonardo was enrolled as painter in the register of

the Compagnia di San Luca. This means that, at the age of twenty, he was already qualified to accept independent commissions. Dating from 1473 is the drawing of the *Landscape of the Arno Valley*, as it appears from Montalbano in the vicinity of Vinci; this is his first known work. Still working in the workshop of Verrocchio, he collaborated with the latter on the *Baptism of Christ* (Florence, Galleria degli Uffizi). This episode gave rise to the anecdote related by Vasari, significant although without historic proof, that the master, upon seeing himself surpassed by his pupil, "never again wanted to touch colors, indignant that a young boy understood them better than he did." Among Leonardo's first independent works are the *Annunciation* (Florence, Galleria degli Uffizi), the *Portrait of Ginevra Benci* (Washington, National Gallery), some Madonnas which have been identified as the *Madonna of the Carnation* (Munich, Alte Pinacoteche) and the *Benois Madonna* (St. Petersburg, Hermitage), dating from a few years later. In 1476 Leonardo was involved in a trial for sodomy but was acquitted, along with other young men from the workshops of artists and artisans, but also from the aristocracy. And it seems that Giovanni Santi, Raphael's father, was referring expressly to the artistic talent and the inclinations of the young Leonardo when in his *Rhymed Chronicle* he hailed Leonardo and Perugino as "Two youths equal in station and in love."

In 1478 Leonardo received an important commission to paint an altarpiece for the Chapel of San Bernardo in Palazzo Vecchio, but this work was never accomplished, perhaps due to the political upheaval occurring in that year consequent



to the Pazzi Conspiracy. Lorenzo de' Medici, after escaping from the conspirators who assassinated his brother Giuliano, managed to consolidate his power and, with consummate political and diplomatic skill, to inaugurate a time of peace and flourishing of the arts, not only in Florence but throughout Italy. It was in fact Lorenzo the Magnificent who sent Leonardo to Milan, to the court of Ludovico Sforza, known as "il Moro", in an initiative that was both diplomat-



Fiorenza (map known as "della catena"),
c. 1472;
Florence, Museo di Firenze com'era.

ic and cultural. As an envoy, Leonardo served not only as painter but also as musician and inventor of a lyre shaped like a horse's skull, a "bizarre and new thing". Departing from Florence for Milan at the age of thirty, in 1482, Leonardo left two paintings unfinished, the great panel depicting the *Adoration of the Magi* (Florence, Galleria degli Uffizi) and the *Saint Jerome* (Vatican City, Vatican Palaces).

Milan. In addition to the gift of the extraordinary musical instrument, Leonardo presented a letter to Ludovico il Moro, in which he offered his services and described his multifold capabilities. In this document Leonardo displayed the full range of the fields of competence he had mastered. Activities of various kinds are listed: from military engineering, to which a large part of the letter was devoted,



Portrait of Lorenzo de' Medici.
1483-1485;
Windsor, RL f. 12442r.

Florence. Section of the Vasari
Corridor leading from Lungarno
degli Archibusieri to the Ponte Vecchio.



with the promise of new kinds of weapons, carriages and bridges, up to architecture, sculpture and painting. From the letter emerges the picture of a thirty-year old Leonardo who, in writing about himself, is fully aware of the value of his amazing versatility: “according to the different cases, I will compose an infinite variety of things...”

For the next seventeen years Leonardo remained at the court of “il Moro”. As ducal engineer he engaged in hydraulic engineering initiatives, regulated water sources by organizing a network of canals, and designed a project for an ideal city built on several levels, based on the principle of separating its various functions. The presence of Leonardo at the Sforza court also satisfied another of Ludovico’s ambitions, that of conferring prestige on his Duchy by creating a refined humanistic ambiance. In this atmosphere rich in intellectual stimuli Leonardo developed the thesis of the *Paragone*, maintaining the supremacy of painting over the other arts (poetry, music and sculpture). His manuscripts are filled with allegories, riddles, emblems, mottos, witticisms, fables and prophecies, which he must have used to entertain his highly cultured audience at court. It was here, in fact, that

Angiolo Tricca, *Leonardo as a Boy*
in Verrocchio’s Workshop, c. 1845;
Borgo San Sepolcro, Palazzo delle Laudi.



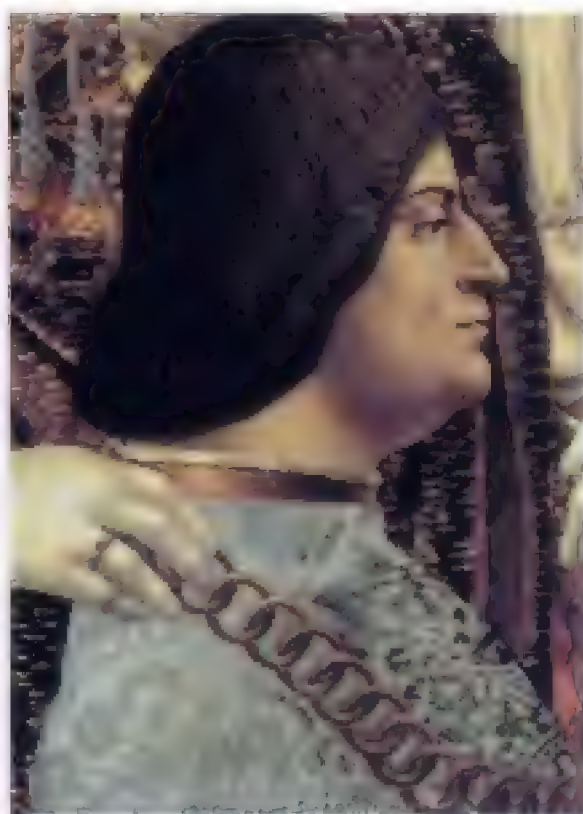


Leonardo came into contact with eminent personages, among them Castiglione, who mentions him in the *Cortegiano* and shows familiarity with his writings in the *Paragone* proclaiming the nobility of painting.

During his first years in Milan Leonardo signed a contract to paint the *Virgin of the Rocks*, painted the *Portrait of a Musician* (Ambrosiana), and drew up a series of projects for the lantern on the Duomo. At court he designed elaborate dec-



Giuseppe Diotti,
The Court of Ludovico il Moro,
1823;
Lodi, Museo Civico.



Anonymous Lombard painter,
The Sforza Altarpiece,
late 15th century,
detail with Ludovico il Moro;
Milan, Pinacoteca di Brera.

Cherubino Cornienti,
*Leonardo in the Refectory
of the Grazie*, 1857;
Milan, Galleria d'arte moderna.



orative sets for wedding celebrations and organized numerous festivals and performances. On these occasions Leonardo perfected scenographic devices of his own invention, designed to arouse amazement in the spectators. In 1490 the famous “Festa del Paradiso” (Paradise Feast) was held,



for which he designed a complicated theatrical machine that reproduced the heavens, the planets and the stars with “special effects” provided by moving parts and the play of lights. For “il Moro”, Leonardo painted two portraits of women: first the young Cecilia Gallerani, the *Lady with the*

Ermine, and then Lucrezia Crivelli, the *Portrait of a Lady* (*La Belle Ferronnière*). In court circles he was now hailed as the new Apelles, capable, like the legendary Greek artist, of challenging nature itself with the life he instilled in his figures ("From Florence an Apelles has been brought here").

In the years he spent in Milan, Leonardo assiduously studied the human figure and the proportions of the body, as is superbly demonstrated by his famous drawing called *Homo Vitruvianus*. Along with his theoretical studies, Leonardo began to extend the field of his research on mankind with direct observation conducted through anatomy, physiognomy and the analysis of movement.

In 1494 he began a series of drawings and preparatory studies for the *Last Supper*, on which he was to work, in the Refectory of Santa Maria delle Grazie, until 1498. In the Castello Sforzesco he decorated the Sala delle Asse with a different kind of wall painting. At the same time, during the last decade of the 15th century, Leonardo worked on the project for a great equestrian statue dedicated to Francesco Sforza, father of "il Moro", intended not only as a celebration of the Ducal family but also as a technical achievement without precedent. "See how in the Court he orders made of metal/ In memory of his father a great colossus:/ I firmly and without doubt believe/ that neither Greece nor Rome ever saw its like in size."

Not only was his work compared to ancient sculptures, such as the *Regisole* that Leonardo had admired in Pavia, but also with the equestrian monuments that two other Florentines had been called upon to sculpt in Northern Italy: the *Gatta-*

melata by Donatello in Padua and the *Colleoni* by his master Verrocchio in Venice. The clay model erected by Leonardo in the Corte Vecchia stood over seven meters high. Already in 1493 he was preparing to fuse the enormous amount of metal required, a procedure for which he planned to use three furnaces at the same time. But the colossus made of clay was to remain such. In 1499 Milan was occupied by the troops of Louis XII, King of France. Leonardo, watching with the eyes of a spectator of history, records the dramatic course of events in a note: "The chamberlain taken prisoner/the Vice-Count overthrown and then his son dead/ [...] the Duke has lost the State and his property and his freedom/ and no work will be finished for him." The last reference is to himself, to those projects commissioned by "il Moro" that would never be finished, first among them the horse. The great clay model was destroyed by the invading soldiers, who used it for target practice. And so in 1499 Leonardo decided to leave Milan, departing in the company of his friend Luca Pacioli. The mathematician Pacioli had arrived at the court of "il Moro" three years earlier, after having published in Venice the *Summa de Arithmetica Geometria Proportioni et Proportionalità*, a book that Leonardo had immediately purchased, as he mentioned in a note.

His contacts with Luca Pacioli encouraged Leonardo to intensify his study of mathematics and geometry, providing him with a reference point for confronting the questions of theoretical nature that were emerging forcefully in his research ("learn from Master Luca"). In 1498 Pacioli had completed his treatise on the *Divina proportione* and had asked

Leonardo to draw the illustrations of the Platonic solids, or regular polyhedrons, the ideal models of perfection understood to be the harmony of proportional relationships. The work was then published in Venice in 1509. In the preface, Pacioli declared that the drawings “of all of the regular bodies [...] have been made by the most worthy painter, perspective architect, musician and man endowed with all virtues Lionardo da Vinci Florentine in the city of Milan [...] from where we then together [...] departed...”

Mantua, Venice, Florence. Upon leaving Milan, Leonardo first stopped at Mantua, where he was welcomed by Isabella d’Este. The Duchess posed for a preparatory drawing for a portrait she had requested from Leonardo as a worthy addition to her precious art collection. Leonardo then journeyed on to Venice, where the government of the Serenissima Republic needed a plan for defending an area, along the banks of the river Isonzo, exposed to attack from the Turks. Leonardo designed an integrated system of fortifications, canals, locks and flooded plains. Before returning to Florence in 1501, Leonardo may have traveled to Rome, as

Gaetano Callani,
Leonardo da Vinci in his Studio,
c. 1872;
Parma, Biblioteca Palatina.



seems probable from one of his notes: "In Rome. In old Tivoli, the house of Hadrian." If this note does not refer to an actual voyage, it reveals in any case Leonardo's new interest in the remains of antiquity: an indispensable reference point for his studies on architecture, as well as for his painting that, starting precisely from the first years of the 16th century, reveals motifs inspired by classical statuary.

Back in Florence, after an absence of almost nineteen years, Leonardo lodged at the Monastery of the Annunziata. Here Pietro da Novellara, sent by Isabella d'Este to demand information on the portrait she was eager to have, visited him. But the news the Marchesa received from Novellara was not encouraging: "His mathematical experiments have so distracted him from painting, that he cannot bear to see a brush." Commissioned by the monks of the Annunziata, Leonardo was however engaged in preparing a cartoon for an altarpiece to be placed above the high altar, portraying *The Virgin and Child with Saint Anne and a Lamb*. When this work was finished, relates Vasari, Leonardo opened his studio to the public, and to see the cartoon, now lost, flocked "men and women, old and young, as if going to a

Jac. Barb. Vigonnis,
*Portrait of Fra Luca Pacioli
with a Pupil*, 1495;
Naples, Museo e Gallerie
Nazionali di Capodimonte.



solemn Festivity, to see the marvels of Lionardo, by which they were all amazed.” He also painted the *Madonna of the Yarn Winders*, two versions of which have survived, painted by pupils with the probable assistance of the master. But in the following year Leonardo, who had reached the age of fifty, was again in departure.

Montefeltro. In 1502 Leonardo entered the service of Cesare Borgia, the son of Pope Alexander IV who aimed to unite under his own dominion the regions of Romagna, Marche, Umbria and Tuscany, thus creating a single strong state in central Italy. Such a multi-faceted personality as Leonardo was crucially important to the expansionist ambitions of Borgia, who, in pursuing his designs with lucid, relentless logic, was the model for Machiavelli’s *The Prince*. Leonardo, in his capacity as “Architect and General Engineer”, was responsible for supervising the entire defensive structure of the territory: fortifications, bastions and encircling walls, especially in the lands of the Duchy of Urbino fallen into the hands of Borgia. With a special safe-conduct authorizing him to move about freely, Leonardo

Leonardo and Assistants,
Madonna of the Yarn Winders,
1508;
New York, Private Collection.

On pp. 46-47:
Anonymous, *Tavola Doria*,
1503-1504,
copy of the central part
of Leonardo’s cartoon
for the *Battle of Anghiari*.







traveled, measured, inspected, surveyed and jotted down notes in his pocket notebook.

Florence. A year later, in 1503, having abandoned Borgia to his enterprise, doomed to failure, Leonardo was back in Florence again. Here, since 1494, the Medici had been driven out and a Republic proclaimed. After the parenthesis of radical reform instigated by Girolamo Savonarola, who was then burned at the stake, the city was now governed by the Gonfaloniere Pier Soderini, elected in 1502. Niccolò Machiavelli was the Secretary of the Florentine Republic. Plans had been made to decorate the Sala del Maggior Consiglio in Palazzo Vecchio, and Leonardo was commissioned to paint the *Battle of Anghiari*. In the same Hall, on the left-hand side of the same wall, Michelangelo was summoned to paint the *Battle of Cascina*. At this same time the Republic asked Luca Pacioli to construct models of his regular polyhedrons. In this iconographic program the two *Battles* were supposed to inflame the spirits of the Florentines with civic virtue, while the models of the Platonic solids would inspire a sense of harmony and equi-

Anonymous,
Leda and the Swan,
copy from Leonardo,
1506-1508;
Florence, Galleria degli Uffizi.

On pp. 50-51:
Cesare Maccari, *Leonardo*
painting the 'Mona Lisa', 1863;
Siena, Soprintendenza
per i Beni Artistici e Storici.







librium. It was in the Monastery of Santa Maria Novella that Leonardo worked on the preparatory cartoon for the *Battle of Anghiari*; meanwhile, for its execution, he developed an experimental technique similar to the *encausto* of ancient times, but this method was to prove a failure. On the walls of the Hall Leonardo painted only the central scene of the great figuration he had conceived, a chaotic struggle of horses and riders.

The group, which Leonardo began to paint in 1505, is documented by a few copies, drawings and paintings, among them the *Tavola Doria*, completed while Leonardo's painting was still visible; that is, before it was destroyed or concealed behind the remodeling work done by Vasari in 1563, when the Hall became the Salone dei Cinquecento of today. Michelangelo too failed to complete his *Battle*, but by 1504 he had finished the statue of the *David*, and Leonardo was called upon to participate in the commission appointed to decide where the statue should be placed. It was decided to place the sculpture, symbol of the young Florentine Republic, directly in front of the façade of Palazzo Vecchio. Of the two great *Battles* commissioned of Leonardo and Michelangelo there remained the cartoons, now lost, which served as model for the following generations of painters, and were deemed so authoritative as to be called "the school of the world."

According to tradition, it was in these first years of the 16th century that Leonardo began the portrait of Monna Lisa del Giocondo (known as the *Mona Lisa*, or *Gioconda*), a painting on which he was to work up to the end of his life. Another

of his paintings from this time was the *Leda*, now lost. Leonardo's elaborations on this theme have survived in a series of studies. Bearing witness to the fame of this painting are the many 16th century replicas it inspired. One of those most faithful to Leonardo's original is the *Leda* now at the Galleria degli Uffizi (formerly in Rome, Spiridon Collection).

In Florence Leonardo delved deeper into the study of geometry, finding in the library of San Marco Monastery the treatises and manuscripts he needed to carry out his research. For the Florentine Republic he hypothesized a project for deviating the Arno, to make the river navigable from Florence to its mouth and to facilitate the conquest of Pisa by cutting off its outlet to the sea. During these same years Leonardo practiced anatomical dissection in the Hospital of Santa Maria Nuova while contemporaneously conducting research on one of the subjects most fascinating to him – flight. This was the time of his *Codex on the Flight of Birds*, and scientific observation that led him to construct a machine designed to take flight upon being launched from Monte Ceceri, near Fiesole, in the hills around Florence. But the enterprise failed, and Leonardo's great technological dream of human flight was never to be fulfilled.

In the cartoon for the *Virgin and Child with Saint Anne and Saint John the Baptist* (London, Burlington House) appear figurative themes that were developed in the following years in the paintings of the *Virgin and Child with Saint Anne and a Lamb* (Paris, Louvre) and of *Saint John the Baptist*. These are the paintings, along with the *Mona Lisa*, that Leonardo later brought with him wherever he went.

Milan. Already by 1506 Leonardo had left Florence to return to Milan, where the French governor of the city had requested his consultation for architectural and engineering projects. Since Leonardo was still under contract to the Florentine Signoria for the *Battle of Anghiari*, he promised to return to Florence within three months, but failed to keep his promise. In the next two years he traveled frequently between the two cities before settling definitively in Milan. There he completed, with the aid of assistants, the second version of the *Virgin of the Rocks*. In the territory of Lombardy he carried out accurate hydrographic surveys as part of a project for channeling the Adda river. He also worked on a new equestrian monument, that of Gian Giacomo Trivulzio, Marshal of France, but this sculpture too was never to be accomplished by Leonardo, although it was considerably smaller in design than the old project for the Sforza family. Above all, during this second stay in Milan, Leonardo intensified his research in anatomy, dissecting corpses in collaboration with Marcantonio della Torre, a physician at the University of Pavia, and in 1510 he completed an entire treatise on the subject: "This winter of 1510 I hope to complete

Raphael, *Portrait of Leo X
with Cardinals Giulio de' Medici
and Luigi de' Rossi*, 1518;
Florence, Galleria degli Uffizi.



all of the anatomy." In 1512 the Holy League established by the pope to combat the French brought about the restoration of the Sforza dynasty in Milan, and the next year Cardinal Giovanni de' Medici was elected pope.

Rome. The year was 1513, and Leonardo, now sixty-one, moved to Rome where Giuliano de' Medici had requested his services. Giuliano, a poet and patron of the arts, was the son of Lorenzo the Magnificent and the brother of the new Pope Leo X. He lodged Leonardo in the Vatican, at the Belvedere, where the artist was to stay for three years, engaging mainly in scientific and technological research. For Giuliano, Leonardo conducted a series of studies for draining the Pontine swamps, and also designed a new port to be constructed at Civitavecchia, where he examined the ruins of the ancient Roman port. His growing interest in the study of water was reflected in these years by a series of drawings of *Deluges*. Increasingly absorbed by his vision, whose theme was the upheaval of the forces of nature, Leonard sought to evoke an extremely remote past, traces of which he detected in the fossils he found on Monte Mario. In Rome he continued to

Raphael, *The School of Athens*, 1510,
detail with Plato and Aristotle;
Vatican City, Vatican Palaces,
Stanza della Segnatura.





dissect corpses, a practice that led him to be accused of witchcraft. Pursuing his speculative interests, Leonardo kept himself apart, in a city that had attracted such pragmatic talents as Bramante, who was occupied in the Vatican with the grandiose undertaking of the Fabbrica di San Pietro; Miche-



Jean Clouet,
François I. c. 1525;
Paris, Musée du Louvre.

Anicet-Charles-Gabriel Lemonnier,
The Century of François I, 1813;
Rouen, Musée des Beaux-Arts.

langelo, who had just finished the frescoes on the ceiling of the Sistine Chapel; and Raphael, who had given the features of Leonardo to the Plato he painted in the Vatican Stanze. In 1515 Leonardo created an amazing mechanism: the automaton of a lion, which could move about, advance, rear up on its hind legs and then open its chest, displaying within it the lilies of France. The mechanical lion had been designed in honor of the new King of France, François I, and was sent as homage from Florence to Lyon, where great festivities were being planned for the king's entrance into the city. Symbolically, the lion alluded not only to Lyon but also to Florence, whose *Marzocco* emblem was a lion; as well as to Pope Leo X, who sought the friendship of the French king and had managed to arrange a marriage between the king's aunt and his brother Giuliano, Leonardo's protector.

France. The death of Giuliano de' Medici, in 1516, must have contributed to Leonardo's decision to accept the invitation of François I and move to France, to the court of Amboise, site of the royal palace. Nearby, at Cloux, the king offered him as residence the little castle of Clos-Lucé, where Leonardo went to live in the company of some of his pupils, remaining there for nearly three years, until his death. The king appointed him "Premier peintre & ingénieur & architecte du Roy, mécanicien d'estat, & c." For him Leonardo planned work on the watercourses of the Loire river and designed a royal palace to be built at Romorantin. He planned it as a residence/city provided with channeling systems that would feed a modern system of running water, as well as

fountains in the gardens and a pool for aquatic jousts. And at the court of France as well, Leonardo organized festivals and celebrations, designing theatrical machines and sets for spectacles in which his famous automated lion was still used. He had brought with him from Italy the *Mona Lisa*, the *Saint Anne* (Louvre), and the *Saint John the Baptist*, continuing to work on these paintings over the years; but otherwise it seems that, in his last years spent in France, Leonardo painted no more, although he never stopped drawing and recording notes in his papers. In 1517 he received a visit from Cardinal Luigi d'Aragona, whose secretary described the meeting with the elderly Leonardo, eager to speak of the vast amount of his research and the wealth of knowledge conserved in his manuscripts: "And he said that he had practiced anatomy on over thirty bodies, both male and female, of every age. He has also written on the nature of waters, on various machines and on other things, as he stated, an infinity of volumes..."

In his will dated April 23, 1519, Leonardo, who had only just reached the age of sixty-seven, appointed as executor his favorite pupil Francesco Melzi; to him he left all of his drawings, manuscripts and the instruments he had with him at the time. Leonardo died just ten days later, on May 2, 1519. He was buried, as he had requested, in a church whose name is significant: Saint-Florentin. The church was severely damaged during the wars of religion and was totally destroyed in 1808. Later, some fragments of a stone bearing the inscription "LEO... INC.../... EO... DUS VINC..." were found, as well as a large skeleton: the remains of Leonardo, now lost.





The legend persists that he died in the arms of François I. Historically, this could not have happened, since the king was elsewhere and it was Melzi who brought him the news, but certainly the French king, his last patron and admirer, must have retained a vivid memory, filled with amazement and esteem, of Leonardo. Testimony to this is provided by Benvenuto Cellini, who, over twenty years later, finding himself at the court of King François, heard him recall the great master, declaring that "Never was there any other man born in the world who knew as much as Lionardo, and not so much of painting, sculpture and architecture as for the fact that he was a very great philosopher." A legacy inseparable from the figure of Leonardo, the legacy of his relentless search for knowledge, is in keeping with his concept of the artist, of the painter, for whom he claimed the universal nature and boundless faculties of Renaissance man: "If the painter wishes to see beauty that enthralls him, he is master to create it, and if he wishes to see monstrous things that are frightening, or that are funny or laughable, or truly compassionate, he is their lord and god. [...] And in effect, all that which exists in the universe as essence, presence or imagination, he has it first in his mind, and then in his hands."

On pp. 62-63:

Jean Auguste Dominique Ingres,
*François I Receiving the Last Breath
of Leonardo da Vinci*, 1818;
Paris, Musée du Petit Palais.

Facing page:

The Church of St. Florentin
at Amboise, where Leonardo
da Vinci was buried, in a photo
from the early 20th century.



LEONARDVS·VINCIVS·



Painting

In his writings on the *Paragone*, Leonardo compares painting, sculpture, music and poetry in various ways, and claims that painting is superior to all of the other arts. Sculpture lacks the component of color and the effects of light and shadows: “it cares not for shadows nor light, [...] for color nothing.” As compared to painting, which endures, music is ephemeral, being “as swift to die as to be born.” As concerns poetry, Leonardo demonstrates the vast difference that exists between the arbitrary nature of words and the universality of images. As an example, he refers to man: “Now see which is most pertinent to man, the name of man or the likeness of man? The name of man is different in different countries, but the form is changed only by death.” And it is here that painting shows its superiority over nature itself, for the power it possesses of rendering eternal in time that which is destined to consume itself in nature: “How many pictures have conserved the image of a divine beauty that time or death has destroyed in such brief time...”

Cristofano dell'Altissimo,
Leonardo da Vinci, 1566-1568;
Florence, Galleria degli Uffizi.

BAPTISM OF CHRIST

This is the painting on which Leonardo collaborated in Verrocchio's workshop. The panel was painted for the Monastery of San Salvi in Florence, where in the 16th century it was recorded as the "Baptism of Christ by Verrocchio", but also as "an angel by Leonardo da Vinci". And in fact it is in the angel on the left, seen from the back in the act of turning to the right, that Leonardo's hand has always been recognized in this work painted by his master. The *Baptism of Christ* appears in fact to be a typical example of the production of Verrocchio's workshop, where the master and his pupils cooperated without any great distinction being made between the different hands.

Verrocchio, having received the commission, must have painted the two main figures of Christ and Saint John the Baptist, leaving the rest of the work to be completed by his pupils. And the participation not only of Leonardo but also of other painters can be seen in this work. The angel on the right may have been painted by Botticelli, who was ap-

Baptism of Christ, 1475-1478;
Florence, Galleria degli Uffizi.



prenticed to Verrocchio at the same time as Leonardo. Some parts of the picture are to be attributed to a painter of lesser skill: the palm tree on the far left, the rocks on the right and the hands of God the Father at the upper center, all of which are rigid and conventional in concept. The part painted by Leonardo, instead, stands out in striking contrast to this unnatural stiffness.

According to Vasari, this episode was the pupil's first trial, conducted under the watchful eye of his master Andrea del Verrocchio, "who was completing a panel showing Saint John baptizing Christ in which Leonardo worked on an angel holding some garments; and although he was a young boy, he painted the angel in such a way that it appeared much better than the figures by Andrea. This was the reason why Andrea never wanted to touch colors again, indignant that a young boy understood them better than he did." Of course Verrocchio continued to paint in the following years, but it is also true that Leonardo's work on this painting revealed not only skillful technical capacity but also a remarkable talent for composition. In addition to the rendering of the figure obtained by subtle employment of the *sfumato* technique, the concept of the angel seen from behind was crucially important to the composition of the painting as a whole. The painting was actually finished around 1475 or soon afterward, at the time when Leonardo was already working as an independent painter, and it is probable that he was assigned the duty of completing the work. This was not an easy task, due to the stylistic imbalance of the composition resulting from its having been the



work of different artists. The invention of the angel turning his head in a twisting movement to direct his gaze at the face of Christ creates a guiding line that draws the spectator's attention from the outer margin to the center. This solution provides balance to the opposite guiding line provided by the entire figure of John the Baptist. And the hand of Leonardo can also be recognized in the glimpse of a distant landscape above the angels' heads. Here the river Jordan, where the scene of the Baptism is taking place in the foreground, flows through a broad valley whose bright surface reflects the light of the sky. Suddenly the receding planes take on depth, starting from the detail of the plant in the foreground, standing out against the light-colored surface of the robes held by the angel, and continuing as far as the distant horizon.

Radiographic examination of the painting has revealed the presence of portions completed in oil above the tempera undercoat. The parts painted in oil are the face of the angel on the left and some elements of the landscape in the background, as well as the hair and the body of Christ. And in fact, it is to Leonardo that the almost impalpable effects of the hair and the layers of veiling that gently soften the anatomy of the Christ figure must be attributed. It is here that scientific examination has revealed traces of Leonardo's fingerprints, in places where he worked the paint directly with his hands.









ANNUNCIATION

This is the first large work painted by Leonardo, in which he was obliged to confront the problems of the general organization of a painting and the arrangement of figures in space. The work, painted for the monastery of San Bartolomeo a Monteoliveto, was moved to the Uffizi in 1867.



Annunciation, 1475-1478;
Florence, Galleria degli Uffizi.

Leonardo was only a little over the age of twenty when he painted it. And in fact, many aspects of the work call to mind his apprenticeship in Verrocchio's workshop.

In some preliminary studies that have survived Leonardo sketches, with great precision, the drapery of the figures he was then to transfer to the painting. These studies were made according to a precise workshop method, and employing the highly refined technique of brush tip on linen. The striking variety of naturalistic details in the representation of the flower-strewn meadow is another element drawn from the teachings of Verrocchio. And the marble base of the Virgin's lectern shows a similar precision of description. The rich bas-relief decoration of scrolls and floral motifs recalls the elaborate sculptural works of Verrocchio, where the extremely precise details seem wrought by a goldsmith's chisel. Moreover, the detail of the gossamer-light transparent veil falling over the side of the lectern to gently brush against the majestic marble base appears to be a demonstration, exhibiting the artist's consummate skill at imitating in painting the consistency of the most diverse materials.

At some points in the ornamental bas-relief, as well as on the fingers of the Virgin's right hand, traces of Leonardo's fingerprints have been detected. The fingerprints found in some of his youthful works such as this one, the *Baptism of Christ* and the *Portrait of Ginevra Benci*, bear witness to the fact that Leonardo was accustomed to work on the pictorial layer with his fingers, to modulate even more precisely the effects he desired to obtain.



In addition to the refined technique applied in executing the individual parts, Leonardo had to deal with the construction of the painting as a whole. Obviously the lectern, the flooring and the architecture are formulated according to the principles of linear perspective, as taught by the pictorial tradition of the Florentine Quattrocento. But within the perspective scheme appear uncertainties, as in the dark area lying between the rusticated stones of the architecture and the isolated tree on the right. Careful examination reveals an anomaly within this rigorous basic construction according to which the various elements are positioned in space. The irregularity that fails to fit into the scheme can be seen in the Virgin's right arm, reaching forward. The Virgin is in fact seated too far back from the lectern, in a position from which she could not reach the left margin of the book and touch the pages with the fingers of her right hand. Was this due to an error made by the youthful Leonardo, who had not yet achieved perfect mastery of his means? Or, in a different hypothesis, is this apparent deformation really intentional, designed expressly to function when the painting is looked at from the side? The latter hypothesis implies that Leonardo knew the exact place where the painting would be hung and foresaw that it could not be looked at directly from the front.

But apart from each individual detail, Leonardo manages to confer compositional unity on the picture in an entirely new way, going beyond the boundaries of linear perspective with his invention of atmospheric perspective. In contrast to the extreme clarity of the elements in the fore-



ground is the misty landscape glimpsed in the background through distant layers of air. The diffused luminosity barely reveals a city overlooking water, a port and boats, a remote life appearing below high mountains that are almost invisible. And the sense of this undefined depth, rendered visible through the air, reverberates on the figures and the portentous moment in which they are fixed in painting. The angel's gesture traverses space horizontally to arrive at the Virgin's hand, raised to welcome him. The two personages communicate through the exchange of their corresponding gestures and gazes.

And it was expressly to the concept of annunciation that Leonardo was referring when he defined the need to express intentions and thoughts through the attitudes and gestures of his figures, that is, "let movements announce the motion of the soul..."









ANNUNCIATION

The small panel with the *Annunciation* was a part of the predella that adorned the *Madonna enthroned with Saint John the Baptist and Saint Donato*, commissioned to Verrocchio for the Duomo of Pistoia. This great altarpiece, also known as the *Madonna di Piazza*, was painted in Verrocchio's workshop in the years 1478 to 1486, and was mainly the work of Lorenzo di Credi. This young painter had assumed a leading role among Verrocchio's pupils, especially after the master was called to Venice, commissioned by the Senate of the Serenissima Republic to sculpt the equestrian monument to Bartolomeo Colleoni.

The compartment depicting the scene of the *Annunciation*



Annunciation, c. 1478;
Paris, Musée du Louvre.

must have been the central element of the predella. Leonardo worked on it before leaving for Milan in 1482. His unmistakable style is clearly recognizable in the scrupulous attention with which the drapery of the two figures is rendered. But even more clearly, the hand of Leonardo reveals itself in the overall conception of the scene and the restrained gestures of the two personages. The heads bending forward toward each other establish a silent dialogue between the Archangel and the Virgin.

The attitude of the female figure, absorbed in meditation, is reflected in a delicate drawing now in the Uffizi where Leonardo describes, in subtle chiaroscuro, the effects of light on the volume of the face. The spatial organization of the small panel in the Louvre is similar to that of the Uffizi's great *Annunciation*, with the scene unfolding outdoors between a flower-strewn meadow and a kind of open-air room created by the architectural structure. In both paintings, the space in the foreground is enclosed within a garden (*hortus conclusus*) beyond which a distant landscape opens out.

In spite of its small format and the fact that it was painted for a predella, this representation too shows how Leonardo conceived the gestures of his figures as expressions of the intentions of the soul, harmonizing exterior attitudes with inner feelings.



PORTRAIT OF GINEVRA BENCI

This is the first portrait painted by Leonardo. Writers in the past praised its extraordinary likeness, one of them claiming that the artist “painted in Florence from life Ginevra d’Amerigo Benci, with such great success that not the portrait, but the real Ginevra it seemed.” The painting could date from either 1474, the year when the seventeen-year-old Ginevra married Luigi di Bernardo di Lapo Niccolini, or from the next few years. Ginevra was the daughter of the Florentine banker Amerigo, a member of the wealthy Benci family, closely linked to Medici circles. The juniper plant (“ginepro” in Italian) which with its dark mass of pointed leaves frames the young woman’s face with its ivory-white complexion, alludes to her name. The diaphanous texture of the image is further emphasized by the almost imperceptible detail of the transparent veil tied under the woman’s neck. For this figure Leonardo appears to have been inspired by the example of Verrocchio’s sculpture, as it shows a close relationship to the marble bust of

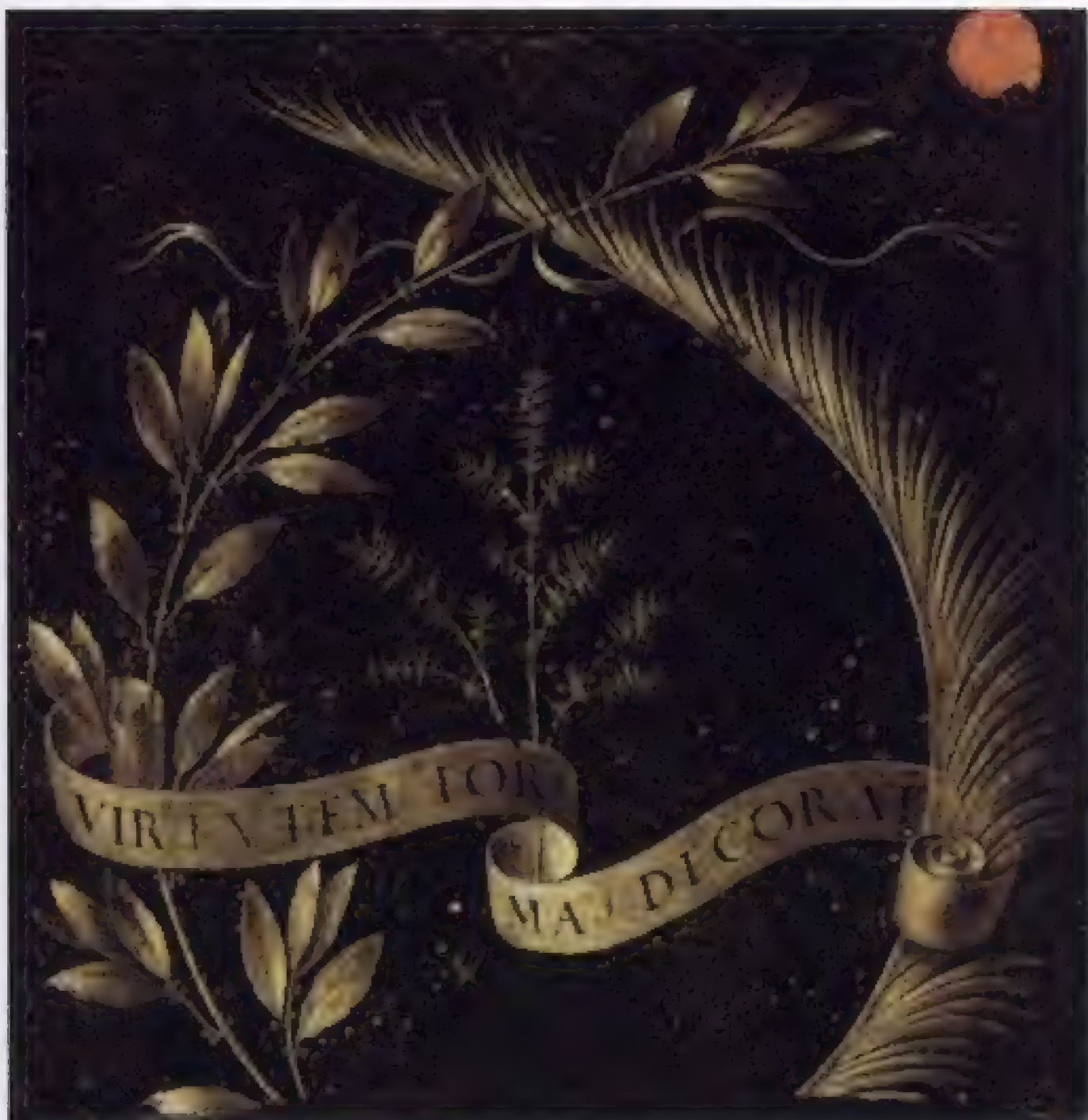
Portrait of Ginevra Benci, c. 1474;
Washington, National Gallery.



the *Noblewoman with a Bouquet* (Florence, Museo Nazionale del Bargello) sculpted in those same years . In comparing the two portraits of women, one pictorial, the other sculptural, the absence in Leonardo's painting of the lower part, in which the young woman's hands with their sensitive gestures must have appeared, is strikingly apparent. In a study now at Windsor, Leonardo's original idea for the missing hands is reflected. The lower part of the painting may have been trimmed off because it was damaged or because it had remained in the state of a sketch. Incidentally, Leonardo left the great altarpiece of the *Adoration of the Magi*, unfinished, with the Benci family when he departed from Florence for Milan in 1482.

The fact that the bottom of the painting was cut off, reducing its height by about one-third, and may have been trimmed at the sides by a few centimeters as well, is confirmed by an examination of the emblem painted on the back of the panel. A juniper branch appears at the center, framed by a palm leaf and a laurel branch, to form a garland that must have been tied at the bottom to hold the three fronds together. Surrounding these plants, imbued

Emblem bearing the motto
«VIRTUTEM FORMA DECORAT»,
painted on the back of the
Portrait of Ginevra Benci.



with symbolic meaning, is a scroll bearing the inscription “VIRTUTEM FORMA DECORAT” [beauty adorns virtue], indicating that outer beauty is only the ornament of inner virtue. And the motto clarifies the connotation of moral portrait attributed by Leonardo to the image of Ginevra, with her enigmatic expression and the powerful impact of her presence and her gaze.

On the reverse side, the panel is painted to resemble a slab of porphyry. In effect, the entire work, both front and back, shows how the artist experimented with pictorial techniques to achieve illusionist effects. Here Leonardo gives proof of how painting is capable of representing a great variety of natural effects. His analytical attention to the rendering of details reflects examples of Nordic painting, so much so that this portrait was once thought to be the work of Lukas Cranach. But, in accordance with his growing sensitivity to atmosphere, Leonardo introduces a subtle vibration in the surfaces of the picture: from the soft scrolls of the curls framing the young woman’s face, to the distant trees reflected in the waters of a lake. And he investigates the effects of the light that, in the foreground, falls from above to create shimmering reflections on the hair, while further back the clear sky appears in sharp contrast to the dark tips of the juniper leaves, seen against the light. Lastly, in the landscape opening out on the right, the high line of the horizon can be distinguished, suggested through the gradual fading of the colors as the distance increases.

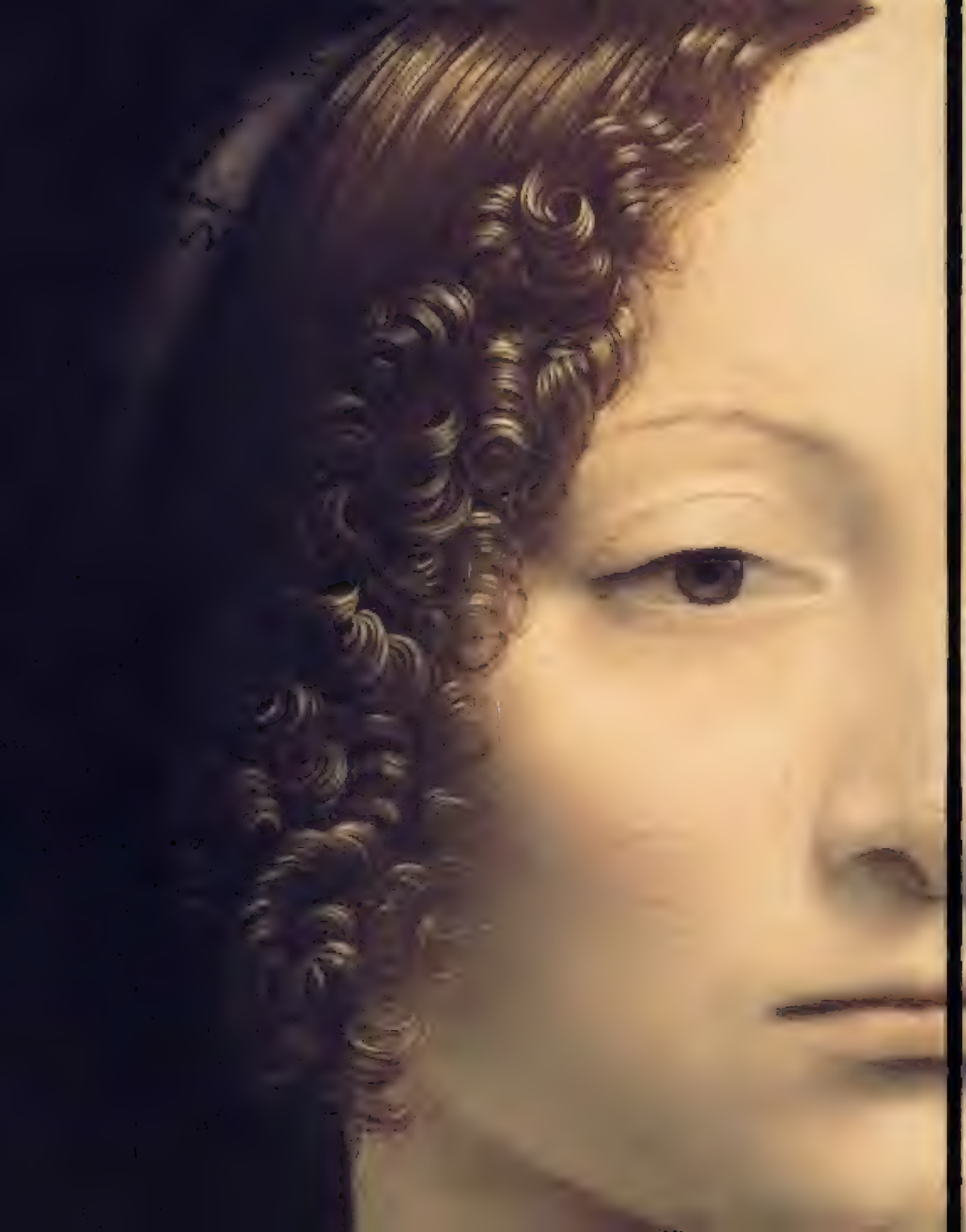
A close examination shows that Leonardo used his fingers to distribute the color on the juniper leaves and even more



on the young woman's face, around the eyes, to confer on the modeling a fine skin-like effect. The fingerprints left by Leonardo on the surface of the painting are found only in this portrait and some of his other paintings from the first Florentine period, such as the *Annunciation* (Florence, Galleria degli Uffizi) and the *Baptism of Christ* (Florence, Galleria degli Uffizi). The adoption of this method shows how the artist sought to apply the paint with an even greater effect of *sfumato* than could be obtained with the brush.

It has been suggested that this painting may have been commissioned to Leonardo by Bernardo Bembo, who had been sent to Florence from Venice as ambassador, and who felt for Ginevra Benci a Neo-Platonic love of which poetic testimony has survived. Should this be true, it would be important insofar as it allows a close tie to be established between this work and Venetian circles. More specifically, it would indicate that Giorgione drew direct inspiration from Leonardo's concept for his *Portrait of Laura* (1506; Vienna, Kunsthistorisches Museum). Giorgione's portrait is, in fact, organized according to a similar scheme, with the presence of a laurel bush whose branches frame the face of the woman portrayed, clearly alluding to her name.







MADONNA OF THE CARNATION

This painting is considered to be one of the first independent works accomplished by Leonardo in Florence. The pose of the Madonna, with her hand raised, delicately holding a flower in her fingers, is borrowed from Verrocchio's models; and her face still resembles a type of female head common to the repertoire of the workshop where Leonardo had served his apprenticeship. Moreover, the painting is closely related to another Madonna and Child, the *Dreyfus Madonna* or *Madonna of the Pomegranate* (Washington, National Gallery) painted by an artist in Verrocchio's circle, perhaps by Leonardo himself while still very young. As regards Leonardo's earliest activity, some interventions dating from the time when he had not yet received independent commissions and was collaborating on pictures produced in the workshop have been recognized. These interventions have been found in three pictures, all portraying the Madonna and Child, in which Leonardo seems to have painted: a lily held by an angel and a rocky peak in the land-

Madonna of the Carnation, 1473-1478;
Munich, Alte Pinakothek.



scape (in a painting in the London, National Gallery) and again, the details of rocks in the background (in two paintings at the Staatliche Museen in Berlin). Lastly, in the *Tobias and the Angel* (London, National Gallery) attributed to Verrocchio, Leonardo painted, in all probability, the little dog and the fish, giving proof of his ability to instill painted objects with the vitality of nature.

In the painting now in Munich the Madonna's head stands out against a dark background, adorned by the luminous, transparent lace of the veil that embellishes her elaborate hairstyle. The refinement of the details distinguishes this figure and the entire composition in general, from the delicate colors of the garments to the reflections of the brooch framed in pearls and the elegant gesture of the hand holding out the bright red carnation, up to the balustrade in the foreground. On it are placed, first the soft cushion on which the Child rests, then the drapery with its chiaroscuro effects and lastly the precious vase of flowers.

Here Leonardo reproduces with consummate skill the effect of transparency of the ornate glass. The presence of this very detail suggests that the work should be identified as a painting described by Vasari, the *Madonna of the Carafe*, a painting owned by Pope Clement VII, a member of the Medici family. The detail of the carafe is, in fact, praised as a fine example of the remarkable illusionist effects of Leonardo's painting, which, in imitating nature, seems to bring it back to life. Vasari states, in fact, "He painted a carafe filled with water with some flowers in it, where, apart from the marvelous naturalness, he had imitated the dewy drops of wa-



ter on it so well that it seemed livelier than life itself.” And to render more effectively the transparency of the skin, Leonardo must have attempted an experimental application of oils and paints, which are visible today under close examination, since they have clotted on the surface of the painting. The areas involved are the Madonna’s face and the Child’s body. Here, especially on the arm, to represent in detail the folds of flesh typical of infants, Leonardo intensified the chiaroscuro effects, as in his studies of drapery. In addition to the flesh tones, great attention to color combinations can be observed in this painting, especially in the Madonna’s robes. In Leonardo’s youthful works in particular can be seen the tendency to employ a specific range of colors for the garments – red, green, yellow, blue and violet. And in his subsequent theoretical treatises, Leonardo states his preference for color combinations of this type: “The colors that go well together are green with red or violet or mauve, and yellow with sky blue.”

The figure of the Madonna appears inscribed between the two mullioned windows embellished by a slender central column, beyond which the view sweeps over a vast landscape. In this broad horizontal panorama over a territory the tones gradually fade, from brown in the foreground to faint blue in the farthest distances.







BENOIS MADONNA

This painting has been identified as one of the two pictures of the Madonna that Leonardo began to paint in Florence in 1478, a circumstance of which he himself informs us in a note: “[Decem]ber 1478 I began the 2 Virgin Marys.” Unlike the traditional type of standing Madonna, to which the *Madonna of the Carnation* still belongs, here the young mother is shown in a very familiar attitude, with the fulcrum of the painting consisting of the affectionate relationship that binds her to the Child seated in her lap. And the innovative aspect of this small painting is, in fact, the intimacy in which the two figures are enveloped. Not by chance was Leonardo to reiterate the same position of the leg extended diagonally, draped in blue, over thirty years later, for the Madonna stretching out her arms toward her son in the painting of the *Saint Anne* (1510; Paris, Louvre). But here the affectionate exchange lies in the smile barely apparent on the lips of the young mother, whose suspended emotion Leonardo captures superbly. This figure clear-



ly shows a transposition of Leonardo's studies on what he was to call the *moti dell'animo* (motions of the soul), and the painting, in this sense, foreshadows the *Adoration of the Magi*. Since those "heads of some women laughing" modeled in sculpture by the young Leonardo have now been lost, the example of the *Benois Madonna* displays in another medium his efforts to portray that expression, which is perhaps fixed here for the first time in a painting: the delicate smile expressed by the vivacious eyes and the barely open mouth showing a glimpse of the teeth.

The child is intent on observing the object held out for his attention. One of his hands rests on that of his mother, as if to hold it still, while with the other he grasps the little flower, gazing at it in curiosity. In this case the white flower that the Madonna is offering her child is the crucifer, recognizable as a symbol of the Passion, but the symbolic meaning of the scene, which thus alludes to the sacrifice of Christ, is fused in the painting with the spontaneity and naturalness conferred on the two figures by Leonardo. The Virgin, holding the Child in her lap, is depicted in a bare, enclosed space. Through the little window at the back, only a portion of luminous sky can be seen. Scientific examination of the painting has shown that the window once opened onto a landscape and was painted over later, probably because it had remained unfinished. In any case the figures, placed in a domestic interior, are enveloped in shadow and brought into relief by the direct light falling on them from above. Here Leonardo begins to conceive of painting as experimentation in the optical phenomena that



occur in relationship to the figures, according to a concept he was to develop still further in the paintings done during his years in Milan.

For its innovative characteristics of unity and vivacity, this work was immediately acclaimed by his contemporaries, and became the model for a number of paintings of the *Madonna and Child*. Copies by many painters have survived, among them one by Filippino Lippi at the Galleria Colonna in Rome. Other replicas differ in some points but clearly reveal their relationship to Leonardo's invention. One of these, now in Dresden, was painted by Lorenzo di Credi, who had also been apprenticed to Verrocchio.

It has been suggested that the work should be considered a Medici commission, due to its dating of around 1478, the year of the Pazzi Conspiracy in which Giuliano de' Medici, brother of Lorenzo the Magnificent, was assassinated. In the Child clutching the flower symbolic of martyrdom, Leonardo may have portrayed Giuliano, a son of Lorenzo the Magnificent, born in 1479 and named after his uncle in memory of him. If this is so, Leonardo would have portrayed, in this infant, that same Giuliano de' Medici who, almost thirty-five years later, was to invite him to Rome, where Leonardo remained in his service for nearly three years before deciding to leave for France, immediately after Giuliano's death in 1516.







ADORATION OF THE MAGI

The commission for this altarpiece dates from 1481; this is the only official documentation of a work painted by Leonardo during his first Florentine period. The great altarpiece was painted for the monastery of San Donato a Scopeto, near Florence.

The commission was probably conferred on Leonardo through his father's connections. Ser Piero, in fact, acted as notary for the monks in the monastery. However, Leonardo left for Milan the following year, leaving the panel in its unfinished state to be safeguarded in the home of Amerigo Benci, the father of the Ginevra whose portrait he had painted some years earlier. Fifteen years later Filippino Lippi was to paint for San Donato a Scopeto an altarpiece representing the *Adoration of the Magi*, now in the Galleria degli Uffizi, which in part reflects the original design of Leonardo.

Vasari provides information on the work, including mention of the incompleteness that was distinctive of so many of Leonardo art works: "He began a panel with the Ado-

Adoration of the Magi, 1481;
Florence, Galleria degli Uffizi.



ration of the Magi on which are many beautiful things, especially the heads [...] which too remained imperfect like his other things.”

In this work, Leonardo took up the challenge of historical painting, that type of representation in which many figures are present to illustrate the unfolding of an event of historical, religious or mythological nature. A theoretical basis for this figurative genre had been provided by Leon Battista Alberti, who in his treatise *De Pictura* defined *historia* as a narration acted out by various personages before the eyes of the observer. The great trials undertaken by Leonardo in historical painting were to be the *Last Supper* in Santa Maria delle Grazie in Milan and the *Battle of Anghiari* in Palazzo Vecchio in Florence, which would have been a monumental demonstration of the wealth of potentiality recognized by Leonardo in this form of representation.

The general organization of the scene conceived by Leonardo reveals his great innovative talent in interpreting a subject, such as the Adoration of the Magi, which was strongly rooted in the Tuscan figurative tradition. The fulcrum of the painting is the figure of the Madonna seated in the foreground with the Child in her lap; around this central core Leonardo orchestrates, in a spiraling motion, the crowd of persons surrounding her.

Preliminary drawings show that Leonardo had originally designed a strictly perspective scheme within which to place his figures; a solution he later abandoned in favor of a freer definition of space, obtained through the effects of light and shadow and the movements of the bodies.



In Leonardo's vision, the unified composition of the *Adoration of the Magi* is achieved through the positioning of a multitude of figures, each of them expressing a different emotion before the revelation of the Epiphany. In the personages appearing in this painting, Leonardo deepens his study of variations in the movements of bodies, the gestures of hands, in physiognomies, ages and facial expressions (creating those "heads" praised by Vasari).

Although the great panel was left in the state of a monochrome sketch, Leonardo went beyond the stage of a detailed preparatory drawing so far as to achieve a fine modulation of chiaroscuro with transitions in tones ranging from black to brown, to red and then to a greenish tint. The dark brushstrokes create areas of shadow, pushing them into the background so that the light-colored preparatory base emerges to form the lighted surfaces. This technique confers on the figures a strong effect of relief, although the reading of the work is now impaired to some extent by the presence of areas of severely oxidized paint on the surface. In the background, on the left, is a crumbling architectural structure, alluding to the ruins of the pagan world, with pilasters and tiers of steps thronged with figures. In the upper right-hand corner, above the barely-sketched figures of the ox and the ass, appears the sloping roof of the hut of the Nativity, almost outside of the composition and thus indicating a moment in time prior to that of the scene of the Adoration, which Leonardo sets in a different space, outdoors. Still on the right, in contrast to the scene unfolding in the foreground, the territory between the ruins and the



hut is occupied in depth by a battle fought by men on horseback. Here, the artist's intention of rendering the impetus of the clash anticipates the basic concepts of the project for the *Battle of Anghiari*, which Leonardo was to work on twenty years later, after his return to Florence.

On the far right and the far left two standing personages, like the wings of a stage, introduce the spectators to the scene. The one on the left, an old man wrapped in a cloak and absorbed in contemplation, occupies the space in the foreground next to a figure seen from behind, kneeling, who recalls the angel painted by Leonardo in Verrocchio's *Baptism of Christ*. The figure on the right is instead a young man whose gaze is turned outward, beyond the edge of the picture, while his right arm is raised, pointing toward the center of the composition. It has been suggested that this figure, whose presence sanctions the transition from the outer space of the observer to the inner one of the painting, is a self-portrait of Leonardo at about the age of thirty.







SAINT JEROME

Since the client of the *Saint Jerome* is unknown, the original destination of this painting, begun by Leonardo in Florence a short time before he left for Milan, is also unknown. The work remained unfinished, like the *Adoration of the Magi*, in the state of a monochrome painting.

The theme of the penitent St. Jerome served as inspiration for Leonardo to represent a scene in which the dramatic atmosphere is determined by the subject's facial expression and the description of his body.

In Leonardo's compositional scheme, the Saint is portrayed in the act of beating his breast with a stone grasped in his fist, while with the other hand he pulls aside his garment to reveal the structure of his body, strongly modeled by chiaroscuro in high contrast. The anatomical study of the figure, with the neck and collarbone standing out in accentuated relief, is striking. But as compared to Leonardo's subsequent scientific research conducted through the dissection of corpses, this is still a kind of artistic anatomy,



aimed at rendering the external aspect of the body rather than revealing its inner structure. But what is exceptionally effective is the synthesis of the figure, resolved in the dynamic force of the gesture.

With one knee extended in the direction opposite that of the arm, the body reveals the three-dimensional quality of space. The arm stretches out, like the pointer of a compass, as far as the left margin of the picture and is ready to rotate, hinged on the shoulder. The entire painting is occupied by this action, which suggests the movement itself, the moment before and the moment after.

Framed in a scenario of rocks both nearby and far away, foreshadowing the setting of the *Virgin of the Rocks*, the figure of the Saint stands out against a dark background. The landscape opens out to the left to reveal the steep profile of distant mountains, delineated with long brushstrokes. On the right, through an opening in the rocks, appears the veduta of an architectural structure viewed in perspective. This synthetic sketch has been recognized as a representation of Santa Maria Novella, the Florentine church whose façade had been completed by Leon Battista Alberti some ten years earlier. The gap between the rocks is bounded, on the far right, by a foreshortened Christ on the Crucifix, whose barely suggested profile bends to meet the Saint's gaze. The light-colored profile of the lion, scored by brushstrokes to indicate the thick mass of its mane, forcefully suggests the impetus of its roar.

It has been observed that the figure of the *Saint Jerome* could be one of the throng of personages appearing in the



Adoration of the Magi; it is, in fact, in these two works that Leonardo depicts the physiognomy of old men for the first time. Later, in his writings, he was to express the need to diversify the figures according to age, illustrating in detail the changes that occur in the body from youth to maturity, and then to old age. The painter, according to Leonardo, should thus describe the figures in these terms: "young men with few muscles in their limbs, and veins of delicate surface, and rounded limbs of pleasant color. In mature men, the limbs will be muscular, showing the nerves. In old men, they will be wrinkled, rough and full of veins, and the nerves very evident."

Over the course of time this panel has been severely damaged. The section containing the Saint's head was actually removed and used for the seat of a stool, while the rest of the wooden support was used as the cover for a box. The two parts were found again by Cardinal Joseph Fesch, Napoleon's uncle, and were then reassembled.







VIRGIN OF THE ROCKS

The first document to mention Leonardo's presence in Milan is the contract for the *Virgin of the Rocks*, dating from April 1483. This painting was commissioned by the Confraternity of the Immaculate Conception, and the names of the brothers Ambrogio and Evangelista de Predis appear in the document along with that of Leonardo. The plan called for several painted panels, to be inserted within the complex structure of a wooden altar, carved and decorated, already completed by Giacomo del Maino. The work as a whole thus included both painting and sculpture, and was destined to the Chapel of the Confraternity in the Church of San Francesco Grande in Milan, now destroyed.

Leonardo's collaborators would therefore have been Evangelista De Predis, who was to refinish and decorate the wooden altar, and his brother Ambrogio, who was to paint eight musical angels, four on each side, for the lateral panels. Leonardo was to paint the central element in which he was requested to portray an "Our Lady", the Virgin,



in honor of the dogma of the Immaculate Conception. Of the work painted by Leonardo, known as the *Virgin of the Rocks*, two versions exist, one in Paris at the Louvre, the other in London at the National Gallery. Identical in size, the two versions differ significantly in composition and style. The one in the Louvre, originally painted on a panel but transferred to canvas in the 19th century, is the first version and the only one entirely by the hand of Leonardo. Echoing his previous Florentine experience, it can be dated to the 1480s on the basis of stylistic evidence.

Leonardo envisaged a scene abounding in complex symbolic implications, starting with the setting in a rocky landscape, traversed by streams flowing to be lost in the distance. Within this scenario, created by the geological stratifications in which the figures are immersed, surrounded by flourishing vegetation, looms the dark cavity of the grotto, evoking the mysteries of nature and the origin of life.

The observer is summoned to enter the composition, introduced into the scene by the Archangel Gabriel, on the right, who turns on him a gaze both eloquent and enigmatic, accompanied by a gesture of the hand, pointing to the infant Saint John, while with his other hand he supports the Christ Child. In defining the angel's head, Leonardo echoes a drawing, now in Turin, in which he fixes the face, and the evocative gaze directed at the observer, of a young woman who resembles Cecilia Gallerani (*Lady with the Ermine*).

The pyramid-like arrangement holds the four figures in a tight exchange of gestures and gazes. At the apex is the



Virgin who, her hand raised as if in a solemn act, holds her open palm over the Child, seated in the foreground below her. The angel's hand, occupying precisely the space between the Virgin's hand and the Child's head, introduces a straight horizontal line, as if to form the sign of an invisible cross. The Christ Child's gesture of benediction is directed at the infant Saint John, kneeling with hands joined as if in prayer. The circle is closed by the ample movement of the Virgin's arm, extending to include the infant Saint John and opening her mantle to reveal the luminous surface of the lining.

The figures emerge from the darkness, brought out by the light falling from the upper left-hand side. Through the stratagem of placing the figures on the threshold of a shadowy space, in this case the grotto, and lighting them from above, Leonardo verifies an optical phenomenon he had already experimented with on a smaller scale in the *Benois Madonna* (c. 1478). Transposed here to the majestic scenario of the rocks, this condition heightens the intensity of both lighted zones and shadows, determining a phenomenon defined by Leonardo in his theoretical writings as "augmentation of shadows and lights", in other words, contrast. The effect of the extreme contrast in lighting almost entirely nullifies the half tones, the intermediate transitions between light and shadow, so that the lighted parts have no shadow tones while their light, luminous reflections cannot be distinguished in the shadows. This phenomenon was theorized by Leonardo himself: "Due to this augmentation of shadows and lights the face appears







in sharp relief, and in the lighted part the shadow is almost imperceptible and in the shadowy part are almost imperceptible lights." This is apparent in the figures, where the light stops on the surfaces turned upward and leaves wrapped in shadow, in the central part of the picture, the bodies of the Virgin and the infant Saint John, the Christ Child's back, and the angel's left hand and right foot, barely perceptible in the semi-obscurity.

Against an almost monochrome background, the contrast between light zones and dark ones is based on distance, with the dark, sharp contours of the rocks in the grotto appearing in close confrontation, as if as in a play of jointed parts, to the light peaks of hazy profile in the distant mountains. Here Leonardo re-creates the phenomenon of layers of moist air, interposed between the eye and the landscape, which produces a blurred vision.



VIRGIN OF THE ROCKS

(second version)

This is the second version of the *Virgin of the Rocks*, painted by Leonardo with the aid of assistants. The picture, now in London, is documented as coming directly from the Church of San Francesco Grande in Milan. It may thus be identified as the panel that was effectively placed at the center of the altar in the Chapel of the Concezione, as stipulated by the original contract dating from 1483.

The first version was probably completed within a few years but, instead of being consigned to the Confraternity that had commissioned it, it had been sold for one hundred ducats to either the King of France or Ludovico il Moro, who may have then donated it to Emperor Maximilian I. In any case, that painting, now in the Louvre, formed part of the French royal collections already in the first half of the 17th century.

Furthermore, it is possible that in place of the first version, imbued with obscure symbolic significance, it was decided

Virgin of the Rocks,
1491-1495 and 1506-1508;
London, National Gallery.



to have a second version painted, introducing simplifications which are apparent in this panel belonging to the National Gallery. For the iconographic program in fact, centered on the figure of the Virgin, Leonardo was probably inspired by the Gnostic vision of the Blessed Amedeo Mendes da Silva, whose text *Apocalypsis Nova* he may have owned. In this interpretation, a fundamental role was assigned to Saint John (as indicated by the gesture of the angel emphatically pointing to him, in the first version); while the Virgin represented the fullness of perfection and, viewed in reference to Wisdom, was identified with the idea of universal knowledge, being attributed with the gift of "total science".

As regards the composition, obvious changes can be seen especially in the figure of the Archangel Gabriel. These changes were probably made at the request of the monks of the Confraternity, who may have been disturbed by the importance given to the infant Saint John in the previous version. Accordingly, both the pointing hand and the gaze with which the angel invited the observer to approach the mystery of the representation, were eliminated. The angel now has a dreamy, absorbed expression and the painting as a whole has lost that complex network of mutual references designed in space by the figures through their interwoven gestures and glances.

The message seems entrusted to more conventional elements, such as the halos and the cross borne by the infant Saint John, which renders him easily recognizable; but these details could also have been added during the course



of the following centuries, since they do not appear in old copies of the painting.

The picture was painted by Leonardo in the 1490s, although it remained unfinished, as proven by the fact that he was urged to return to Milan to complete it in 1506, while he was residing in Florence. However, much of the work was delegated by Leonardo to his collaborators, Ambrogio De Predis, already mentioned in the contract, and perhaps also Marco d'Oggiono and Giovan Antonio Boltraffio, his most important Milanese pupils. Under X-ray examination the London painting shows a great number of corrections, especially in the positions and the heads of the personages, as if the final result had been achieved by successive adjustments. Leonardo must have made the preparatory drawing by brush, and then added the final touches at the end.

The second version, as compared to the first, represents an evolution in the monumental sense, with a more sculptural rendering of the figures and the structure of the rocky landscape around them. Certainly, the subtle atmospheric effects typical of Leonardo are entirely lacking, and here the background, with the mountains appearing lighter in the distance, gives the impression of a lesson learned and schematically repeated by assistants.

The true hand of Leonardo can instead be seen in the fingerprints with which, in the final stage, he perfected the *sfumato* of the faces; and in the long, slender stalks of the plant, standing out against the rocky pinnacle on the far right, formed of a series of dark brushstrokes, without a



drawing, applied above the existing layer of paint. And most particularly, in the area on the lower right, left unfinished, where the jagged rocky wall at the bottom of the painting is skillfully sketched in monochrome.

The element distinctive to both versions of the *Virgin of the Rocks* is the concept of pictorial space conceived by Leonardo as a dark cavity, permeated by the vital forces of nature, concealing within it a revelation.

Among Leonardo's papers is the story of an experience, perhaps imaginary, perhaps real, in which he, wandering through a dark, rocky landscape, arrived at the mouth of a large cavern. The description conveys the vast number of meanings associated by Leonardo with this concept of a space within which lies the unknown; meanings linked to the search for knowledge, to the mysteries of nature and to the conflicting emotions of curiosity and dread, desire and fear: "And drawn on by my ardent desire, yearning to see the great number of strange and various forms created by the artifice of nature, wandering long amid the shadowy rocks, I came to the entrance of a great cavern [...] I was assailed at once by two things, fear and desire; fear of the dark, threatening cavern, desire to see if any miraculous thing should lie within it."







PORTRAIT OF A MUSICIAN

This portrait dates from Leonardo's first years in Milan. In that city, at the court of Ludovico il Moro, Leonardo had arrived expressly in the capacity of musician and inventor of a bizarre, original musical instrument which he donated to the Duke: a lyre in the shape of a horse's skull. This was a "lira da braccio", to be played with a bow, and we know that Leonardo excelled at playing this instrument, accompanying himself as he improvised songs or recited poetry. As regards Leonardo's innate talent for music, Giorgio Vasari reports in fact that "He studied music for some time, and soon decided to learn to play the lyre, as one on whom nature had bestowed a refined and elevated spirit, accompanying himself as he sang and improvised divinely."

In his writings Leonardo extols the qualities of music, based on the concepts of harmony and proportion, indispensable factors in pictorial composition as well. It was in these terms that he formulated his definition of the relationship



between the two arts: "Music can be called no other than the sister of painting [...] it composes harmony by conjoining its proportional parts..." But music was only a little sister of the art deemed supreme by Leonardo, painting, which is instead pre-eminent and "reigns supreme", as he declared, "because it does not die immediately after its creation, as does hapless music, but remains in being..." And so the portrait conserves the effigy of a person beyond the limits imposed by nature and time.

In the attempt to identify the musician portrayed by Leonardo, one of the several names that have been suggested is that of Josquin des Prez, a French musician at the court of "il Moro". In another hypothesis he is thought to be Franchino Gaffurio, author of the treatise called *Angelicus ac divinum opus*, perhaps referred to by the fragmentary inscription CANT[UM] ANG[ELICUM] appearing on the musical score painted by Leonardo.

But Gaffurio, who had been chapel master of the Duomo in Milan since 1484, was nearly forty years old at the time when this portrait was painted. Leonardo could, instead, have portrayed here the twenty-year-old Atalante Migliorotti, who had accompanied him from Florence on the musical mission to Ludovico il Moro ordered by Lorenzo the Magnificent. Atalante is said to have learned the art of playing the lyre expressly from Leonardo. And Leonardo, in turn, had portrayed the features of his pupil in music in a drawing mentioned in his papers as "a head portraying Atalante, raising his face."

The head of the musician in the portrait is raised in an erect



And. Al.
Handwritten musical notation on a single staff, including a treble clef, a key signature of one sharp (F#), and several notes.

position. His face, in the relief of the cheekbones and the jaw, echoes the anatomical research on the bones of the cranium conducted by Leonardo during those same years. The eyes are fixed on a distant point, and the deeply absorbed gaze seems to allude to the sense of hearing, as if the subject were listening intently to a melody, or were about to burst into song himself.

At some time in the past the hand holding the folder with the musical score was painted over, so that it was covered by the black color of the gown and the ochre tint of the two vertical bands on the unfinished stole. It was only in the early years of the 20th century that a restorer brought back to light the crucially important detail of the folder that identifies the personage as a musician. With this restoration the painting became once more a testimonial to Leonardo's desire to allude, through painting, to the art that was its "little sister" – music.



LADY WITH THE ERMINE (PORTRAIT OF CECILIA GALLERANI)

Commissioned to Leonardo by Ludovico il Moro, this painting portrays Cecilia Gallerani, the Duke's favorite, distinguished in his court for her intellectual gifts, her love of music, philosophy and literature. Here she is shown in the act of turning to the right, her gaze sweeping across the space of the picture, her eyes lit up in a barely suggested greeting, her lips imperceptibly smiling. Leonard's striking ability to catch the spontaneity of an attitude and the mobility of an expression suggest that he may have been applying here his theory of *moti mentali* (mental motions). The representation of the ermine emphasizes still further, in a subtle physiognomic resemblance, the dynamic quality conferred by Leonardo on the figure of the young woman. Radiographic examination of the picture shows that a window has been deleted on the right. In all probability this was done by Leonardo himself, considering that dur-

Lady with the Ermine
(*Portrait of Cecilia Gallerani*),
1488-1490;
Krakow, Czartoryski Muzeum.



ing his time in Milan he was experimenting in his portraits with the phenomenon of a figure emerging from a dark background. And in his notes he mentions expressly a courtyard “with walls painted black” against which to place the subject to be portrayed, in order to achieve the desired effect of three-dimensional relief. In the definition of the figure, the optical phenomenon according to which the parts in shadow receive luminous reflections from the lighter areas is clearly apparent. It can be seen on the neck, the cheek and along the lower edge of the hand; a hand that reveals Leonardo’s anatomical studies and investigation of the structure of the body in terms of joints and the ways in which they bend.

The various interpretative levels that exist for this painting – psychological, emblematic and even political – are linked to the presence of the ermine. In a drawing now at the Fitzwilliam Museum in Cambridge, Leonardo illustrates the *Allegory of the Ermine*, depicting the scene of the little animal that lets itself be captured by a hunter rather than soil its white coat with mud.

The ermine also appears in a collection of writings on real and imaginary animals, a kind of “bestiary” compiled by Leonardo in the pages of one of his manuscripts. It is a small pocket notebook, known today as *Codex H*, and it dates precisely from the years he spent in Milan. Leonardo must have used these notes to elaborate allegories and emblems, and the descriptions of the characteristics of each animal, which are sometimes factual and sometimes entirely imaginary, often contain a moral teaching applicable to the be-



havior of man. Among the others appears this description, which goes under the title of "Moderation": "The ermine, due to its moderation, eats only once a day, and had rather let itself be caught by hunters than flee through the muddy fields, so as not to stain its nobility."

The ermine, with the pure white of its coat, thus alludes to the noble spirit of the woman portrayed. Moreover, a connection can be seen between the name of Cecilia Gallerani and the name of the animal in Greek, "galè". But in addition to revealing the identity of the subject of the painting, like the juniper bush in the *Portrait of Ginevra Benci*, the ermine also clearly refers to Ludovico il Moro.

A sonnet dedicated to this portrait by Leonardo, written by the court poet Bernardo Bellincioni, refers to the Duke, hailing him as "*l'italico morel, biancho hermellino*", insisting on the color contrast between Ludovico's appellative "Moro", or "black", and the symbolic allusion to the white animal adopted by the Duke as emblem: "All ermine he is, although his name is black." Moreover, the King of Naples, Ferrante d'Aragona, had conferred on "il Moro" the high honor of the Order of Saint Michael, fittingly known as the "Armellino".

In conclusion, it may be conjectured that, in Leonardo's portrait, the gaze of Cecilia Gallerani is fixed on Ludovico il Moro himself. The whole painting, in fact, alludes to his invisible presence, as well as to her own eloquent, intense personality.







PORTRAIT OF A LADY (LA BELLE FERRONNIÈRE)

Leonardo painted this portrait too, after that of Cecilia Gallerani, for Ludovico il Moro. The subject has been identified as Lucrezia Crivelli, the Duke's last favorite, who had a son by him and followed him in his flight from Milan at the arrival of the French troops. The name of *Belle Ferronnière* conferred on the subject derives from a mistaken identity dating from the 18th century, when the painting, which already in the past formed part of the royal collections of France, was thought to be a portrait of the mistress of King François I, and was recorded as such in an inventory. The identification with Lucrezia Crivelli is based instead on recognition of this painting as the one mentioned in three Latin epigrams written in the *Codex Atlanticus*, not by Leonardo but by a court poet. Praising the beautiful Lucrezia, they state that "pinxit Leonardus, amavit Maurus [Leonardo painted her, 'il Moro' loved her]".

Portrait of a Lady
(*La Belle Ferronnière*),
c. 1495;
Paris, Musée du Louvre.



This portrait too is of the “shoulder” type, in which the figure is turned three-quarters toward the observer.

As concerns Leonardo’s portraits of women, there is a drawing in the Windsor collection that shows the bust of a woman observed from no less than eighteen different viewpoints. In his theoretical writings, in fact, Leonardo formulates the concept of the infinite variety of positions that can be assumed by the eye in regard to the object it is viewing – the idea, that is, that perception is relative to the place from which things are observed: “The same attitude can be shown in infinite variety, because the places from which it may be seen are infinite in number.”

Based on Leonardo’s theory, moreover, the multiplicity of points of view does not depend merely on the shifting position of the eyes but also on the fact that a body can rotate through space. The two movements are interchangeable, and his suggestion is in fact that of turning either the body or the eye. It is thus clear that, for Leonardo, the choice of a ‘shoulder’ portrait conveys a dynamic sense of volume, insofar as it alludes to the fact that the position fixed by the painting is merely one among all of the possible positions that may be generated by the rotation of a figure, or of the eye around it.

In this case the lady in the portrait appears beyond a balustrade interposed between her and the observer. Her gaze is projected forward toward the right, so that it seems to move from any position in which she is observed.

Moreover, the figure appears enveloped in a luminous glow of warm tones, reflecting the scientific observations con-



ducted by Leonardo on the phenomenon of color. Here, in fact, some results of his research on light and shadow, and especially on the effects of colored shadows, may be seen. Based on the optical phenomena studied by Leonardo, beams of reflected light bear with them the “similitude of colors”. Accordingly, the incident rays of light falling from above to illuminate the flesh tones and the red fabric of the gown cast reflections on the parts in shadow, which thus contribute to forming the color of the surface from which they come.

This is apparent along the lower profile of the cheek, which on the right side, with the rotation of the head, receives a glowing reddish reflection from the illuminated surface of the shoulder. Although the effect is heightened by the color of the dress, it derives mainly from a reaction of the mirror-like surfaces of the flesh: “The reflections of the flesh that receive light from other flesh are redder and of more lovely complexion...”









LAST SUPPER

The commission conferred on Leonardo, to paint the scene of the *Last Supper* on the wall of the Refectory of Santa Maria delle Grazie, formed part of a vaster project promot-



Last Supper,
1495-1498:
Milan, Refectory
of Santa Maria delle Grazie.

ed by Ludovico il Moro. Explicit reference to his patronage appears in the lunettes with the Sforza coat of arms surrounded by garlands of symbolic fruit and fronds alluding to the crucifixion (the pear), to martyrdom (the palm) and to salvation (the apple). The Duke intended to transform the church and monastery into a monumental complex serving a precise honorific function; it was here, in fact, that he wished to be buried. On the architectural level, the project had been conceived by Bramante, who had designed the great tribune as a central element to be grafted onto the existing Late Gothic structure.

The *Last Supper* depicted by Leonardo was to occupy one of the shorter sides of the great elongated hall of the Refectory, while on the opposite side the scene of the Crucifixion, painted by the Milanese artist Giovanni Donato di Montorfano in a still archaic style described by Vasari as “old-fashioned”, had just been completed.

In Florentine painting of the 15th century the *Last Supper* was a recurrent subject, and the scene was traditionally distinguished by the orderly arrangement of the personages, seated along a table that extended to occupy space horizontally. In bold contrast to this static scheme was the innovative interpretation of Leonardo, in which the monumental figures of the Apostles are brought together in an impetuous flow of motion. Leonardo's intention was that of fixing the Apostles' disparate attitudes and reactions at the crucial moment narrated by the Gospels, in which Christ declares, “Verily I say unto you: one of you will betray me” (Matthew, XXVI, 21).



The first description of this work dates from 1498, the same year in which it was completed, and was written by the mathematician Luca Pacioli, a friend of Leonardo, who praises the *Last Supper* in the dedication to Ludovico il Moro that serves as prologue to his treatise *De divina proportione*. For that treatise Leonardo had contributed the drawings of regular platonic solids, symbol of universal harmony. Luca Pacioli confirms Leonardo's precise intention of rendering the Apostle's chaotic reactions of dismay at the words of Christ. In his eulogy he states, in fact, "It is impossible to imagine the Apostles displaying any greater shocked attention at the sound of the voice of the ineffable truth when He said: *Unus vestrum me traditurus est.*" Immediately then, as in the eyes of Pacioli, the newly finished painting appeared to all as a superb theater of gestures, an eloquent demonstration, through the language of images, of how a complex scene in which each personage communicates his own emotional reaction can be rendered so forcefully as to make it seem that only sound was missing: "With acts and gestures they seem to speak one with another, and that other with still another, with vivid and afflicted admiration..."

The results achieved in the *Last Supper* illustrate Leonardo's theories on the *moti dell'animo* (motions of the soul), which had been developed in part through his research in anatomy and physiognomy. In his writings he declares the need to confer on figures the capacity to express, through their attitudes, through the positions of their hands and the expressions on their faces, that is, "with their limbs", the con-



tent of their thought, “the concept of their minds”. It is thus a question of rendering visible through the movements of the body, those of the soul. In the words of Leonardo, “No figure can be deemed praiseworthy unless it expresses through its acts, as far as possible, the passion of its soul.” On this subject Leonardo noted on a sheet, along with other preparatory studies for the Apostles in the *Last Supper*, a precept for the painter: the procedure to be applied in representing a figure is of mental nature, rather than technical or practical, and it consists of focusing on the true character of the subject, that is, on his intentionality. In a reminder addressed primarily to himself, Leonardo states, “When you make your figure, consider well who it is and what you want it to do, and make sure that the work resembles the intention and the objective.” Corresponding to this indication of method is the idea of the figure understood as personage; an indispensable concept that finds expression not only in each subject isolated in a portrait, but also in the figures in historical paintings, where numerous personages interact with one another, as exemplified by the emblematic case of the *Last Supper*.

The close-linked chain of gestures, gazes, expressions and pointing hands binds together the figures of the Apostles, who appear rhythmically divided into groups of three: two groups on each side of Christ, who remains immobile at the center, as the fixed point and origin, through the words he has spoken, of the movement that sweeps like a wave through the figures around him. Starting from the left, the first group portrays, with their three heads turned toward



Christ, Bartholomew, James the Minor and Andrew; the latter in an attitude of dumbfounded amazement succinctly described by Leonardo himself, "with his hands open, showing his palms, he raises his shoulders toward his ears and makes a mouth of astonishment."

The second group, uniting Judas, Peter and John, expresses the most complex significance. The figure of the betrayer who, in the foreground, grasps in his right hand the bag of coins, is inserted among those of the other Apostles, and not placed in isolation on the opposite side of the table, according to the traditional iconography in which he was clearly designated as the predestined guilty one. This concept is rejected here in accordance with the principle of free will, sustained by the Dominical Order to which belonged Santa Maria delle Grazie. Behind Judas, Peter emerges, his old man's face in close contrast to the youthful, delicate features of John. The latter is bending to the left, parallel to the line softly marked by the landscape in the space opening out in the background between him and Christ, whose arm establishes an oblique opposed line.

On the right, the first group seems to question Christ more directly. Thomas points his finger upward, James the Major throws open his arms in a broad gesture of indignation that measures the depth of space and reiterates the diagonal formed by Christ's other arm. Philip points questioningly at himself. At the far right, Matthew, Timothy and Simon are excitedly conversing, with great demonstrative gestures of their hands in dynamic succession, drawing the observer's attention from the edge of the painting toward its center.





The figure of Christ forms the vertex at which the lines of the perspective construction converge, organizing the space in which the scene is set. By placing the vanishing point at a notable height, out of reach from the observer's viewpoint,



Leonardo reveals his intention of using perspective for scenographic purposes, to achieve a monumental effect. The head of Christ, intersecting the horizon line, stands out against the luminous blue of the sky, inscribing itself with-

in the opening of the door at the center, through which, as through the two windows, the landscape in the background appears. In the foreground, the table constitutes a magnificent still life, for the precision of the details and the clarity with which the various materials are rendered, as in the regular pattern of the folds in the tablecloth and the transparency of the wine glasses.

Unfortunately, due to the experimental technique employed by Leonardo, the *Last Supper* very soon began "to perish". Only seventy years after it had been painted Vasari called it "so badly done that all that can now be seen of it is a glaring spot." At the risk of jeopardizing the whole work, as was to be the case with the experimentation attempted in painting the *Battle of Anghiari*, Leonardo's rejection of the durable technique of "buon fresco" satisfies his need to work in successive stages, according to the unpredictable times of creative inspiration.

The *Last Supper* was painted by Leonardo in tempera and oil over two preparatory layers, painting on the wall as if it were a panel. The erratic rhythm of the undertaking is reported by Matteo Bandello, who had witnessed Leonardo at work with his own eyes: "I have seen him (according to the caprice or whim of the moment) leave [...] and come straight to the Grazie: and having climbed onto the scaffolding, take up the brush, and give one or two brushstrokes to one of those figures and immediately leave and go elsewhere."



SALA DELLE ASSE

In those same years in which he painted the *Last Supper*, Leonardo decorated the Sala delle Asse in the Castello Sforzesco. This great hall, which occupies the ground floor of the square tower situated to the northeast, must have been used as a cool retreat in summer during hot weather. Leonardo designed a decoration scheme that reproduces an outdoor space, in which great tree trunks starting from the walls extend their branches to cover the entire ceiling, where they create a dense pergola with a complex interwoven pattern.

The actual execution of the decoration was probably delegated by Leonardo to some of his assistants, but on the basis of his ingenious project, which consisted of conceiving the entire decoration of that hall as a challenge to imitate nature. The concept of reproducing, through painting, a naturalist scenario overlies the celebratory intent. The Sforza coat of arms dominates the room from the center of the ceiling, and plaques bearing inscriptions appear on the

Painted decoration of the Sala delle Asse, with the Sforza coat of arms at the center of the ceiling
1497-1498;
Milan, Castello Sforzesco.

On p. 193:
Monochrome decoration of roots and rocks on the northeastern wall of the Sala delle Asse.



pendentives supporting it; but the tribute to Ludovico il Moro is expressed most significantly by the plants themselves, with the black mulberry tree (*gelso-moro* in Italian) alluding directly to the Duke, not only in its name but also in the qualities associated with it, prudence and wisdom; and in the political symbolism of the column-tree that bears up the State. Moreover, this vision of the plant world, which in its morphological details reflects the studies on botany conducted by Leonardo, is enriched by a distinctive geometric component, in the elaborate artifice of the ceiling simulating a pergola. The branches cross one another to form acute arches and the fronds are tied with cords forming knots in a virtuoso compositional scheme. This motif replicates the geometrical symmetries, the “vinci” alluding to his own name, elaborated by Leonardo in his drawings.

A reading of the original parts is severely impaired today by the heavy repainting of an early 19th-century restoration. A later intervention, in 1954, has brought back to light two large monochrome fragments, painted by brush on the plaster, depicting great roots winding through the rocks and breaking up their stratified structure. These must be the bases of the trunks that terminate above in the geometrical pattern of fronds, the image of organic life and natural forces in action, capable at the same time of both generation and destruction.



*Sala delle Asse:
wall with inscription
decorated
with great tree trunks
(gelso-moro,
black mulberry),
whose boughs
extend to the ceiling
with a pergola effect.*





PORTRAIT OF ISABELLA D'ESTE

This is the portrait commissioned by Isabella, Marchesa of Mantua, at whose castle Leonardo stopped when he left Milan, after the French troops had entered the city and driven out Ludovico il Moro. Isabella d'Este, wife of Francesco Gonzaga, was the daughter of Ercole d'Este, Duke of Ferrara. Her sister Beatrice had been married to Ludovico il Moro. In close contact, then, with the Sforza court, Isabella had even borrowed the *Portrait of Cecilia Gallerani* and ardently desired one of herself painted by Leonardo. The work was to have formed part of the rich collection in her Studiolo. Isabella was, in fact, one of the first promoters of the arts, a collector in the modern sense, according to a formula, later to be adopted by the sovereigns of all Europe, on the basis of which the possession of works of art served to increase a ruler's prestige.

Of the portrait designed by Leonardo the cartoon has survived, in precarious conditions of conservation, with the preparatory drawing done in charcoal and sanguine, with

Portrait of Isabella d'Este,
1499-1500;
Paris, Musée du Louvre.



touches of pastel yellow for the ribbons on the gown. On the cartoon can be seen the holes punched to transpose the drawing onto a wooden support through the technique of dusting. But the work "in color" was never painted, and the cartoon, with the punching that variously interprets the borderlines for transposition onto a panel, constitutes the tangible trace of that delicate stage in which Leonardo passed from the drawing to the painting.

The figure of Isabella is placed behind a balustrade, like that of *La Belle Ferronnière*, and here the hands folded one above the other, presaging those of the *Mona Lisa*, are visible in the foreground. The barely indicated gesture of a finger pointing to a book, at the lower right, alludes to Isabella's intellectual interests. The image harmoniously combines the volumetric perception of the bust, turning slightly, and the line of the profile, which shows an obvious reference to examples of classic portraiture. The whole figure is turning imperceptibly on itself to assume this complicated pose in which the hands are seen from the front while the face appears instead in profile.

This solution can be seen as a synthesis of the *Three views of the same head*, a drawing (Turin, Biblioteca Reale) in which the same personage is studied from three points of view: front, three-quarters and right profile. Perhaps this drawing too, done a short time after the cartoon for Isabella, concealed within itself the project for another portrait of an illustrious personage: Cesare Borgia.



HEAD OF A YOUNG WOMAN (LA SCAPILIATA)

The image portrayed in this unfinished painting expresses Leonardo's idea of beauty linked to the concept of natural grace. In his notes Leonardo suggests focusing attention on the properties generated by changes in the light as it falls on faces. The conditions he deems most congenial for observing the evocative tones of varying light are caused by atmospheric changes, that is, by alterations in the weather and by the different times of the day at which the luminosity of the sky varies. And it is, in fact, in looking directly at the persons he meets "in the streets, as evening falls", that Leonardo suggests acquiring experience by contemplating faces immersed in the subtle nuances of light and shadow. Accordingly, he writes, "Consider in the streets, at the approach of evening, the faces of men and women during bad weather, how much grace and sweetness can be seen in them."

Head of a Young Woman

(La Scapiliata),

c. 1508;

Parma, Galleria Nazionale.



Wondrous admiration can be aroused by the sight of a face in a painting, but in real life as well, at its manifestation of grace and sweetness. The contrast arises, then, between these natural gifts and the useless ostentation of artificial ornaments, as noted by Leonardo: "Do you not see among human beauties how the sight of a beautiful face, and not that of rich ornaments, stops the passersby?"

But the indication, found in his notes, that is most fitting to the theme of *La Scapiliata* is his recommendation that heads should be portrayed with the hair blown by the wind. *La Scapiliata* incarnates this particular precept for painting: "Make your heads with the hair tossed by a fictitious wind around youthful faces, and with different turnings graciously adorn them."

The free play of tousled, wind-blown hair resembles, in Leonardo's theory, the representation of flows of currents of water. The lines of force of whirlpools in their spiraling motion are designed like waving, curly locks of hair. In Leonardo's manuscripts this similitude is seen as based on the fundamental logic of his thought, which recognizes continuous analogies between the forms existing in nature. And this explains the spontaneous, pointed criticism with which Leonardo ridicules those who, on the contrary, oppose to natural beauty a vain search for artificial splendor: "And they have always as their adviser the mirror and the comb, while the wind, as it tosses and tangles their smartly dressed hair, is their greatest enemy."

The first news of this work dates from the 19th century, when it entered the collections of the Accademia di Belle



Arti in Parma. The reference to the small panel emphasizes the exceptional nature of the acquisition, calling it “a little Leonardo da Vinci, an extremely rare thing to find in our day.”

In the 20th century this head of a young woman was identified as a work by Leonardo mentioned in the Gonzaga inventory of 1625. It was here that the term *scapiliata* (woman with tousled hair) was first used to describe the subject in one word, a word that was then to become the name of the work: “a painting depicting the head of a woman with tousled hair, sketched with violin frames, the work of Leonardo da Vinci.”

The monochrome painting was executed in umber, green amber and white lead preparation on a poplar-wood panel. Stylistic affinities with the cartoon for the *Saint Anne* in London, painted around those same years, have been recognized, as well as with the second version of the *Virgin of the Rocks*, finished in 1508. In the latter case there is a close analogy with the technique employed by Leonardo to delineate the sketch, still readable in the non-finished parts, such as the left hand of the angel supporting the Child, where brushstrokes applied with the same speed and freedom as those distinctive of *La Scapiliata* have been observed.



VIRGIN AND CHILD WITH SAINT ANNE AND SAINT JOHN THE BAPTIST

It was around the turn of the century, about 1500, that Leonardo, upon returning to Florence after a period of almost twenty years spent in Milan, began to develop the theme of the *Saint Anne*. The central core of the composition is the figure of Saint Anne, the Virgin's mother; close beside her is her daughter, who holds the Christ Child in her arms. The most striking invention is the way in which the bodies are forcefully linked to one another, rendering visible the relationship between mother and child. The figures in this group are positioned in space according to a logical succession of movements and emotions of which Leonardo experiments infinite variations in his drawings. The various studies are in fact dedicated to coordinating the poses, inclinations, directions and mutual interweaving of the limbs. The graphic elaboration produces a series of alternative solutions, which reveal continuous research, aimed at

*Virgin and Child with Saint Anne
and Saint John the Baptist,*
1500 or 1506-1508;
London, National Gallery of Art.



bringing forms into dynamic harmony with one another. Leonardo continued to work on this composition, developing it through sketches and studies, for over ten years, before he finally arrived at completing the work now at the Louvre in Paris. In addition to the modes of interaction between the principal figures, a further variation on the theme consists of the presence beside the Christ Child of either the young Saint John, as in the cartoon in London, or the lamb, as in the painting in Paris.

The first testimony of a picture with Saint Anne on which Leonardo was working dates from 1501 and mentions a cartoon in which there appears "a Christ Child about one year old who, leaning almost out of his mother's lap, has seized a lamb which he seems to be pressing to him." This work, now lost, was seen in Leonardo's studio, then located at Santissima Annunziata, by the agent of Isabella d'Este, who reported, "This sketch is not yet finished." The iconography he describes, with the presence of the lamb, seems to refer to the solution Leonardo was to adopt for the painting, while as regards the London cartoon, with the young Saint John, critics are divided between the hypothesis that this work too dates from around 1500, and the opinion that it is instead, like the painting now in Paris, the later elaboration of ideas matured over the course of years. The drawing, now in the British Museum, datable at around 1508, constitutes a reference for the composition of the cartoon; here the lines drawn in charcoal are so thick and close together as to render the figures barely legible, as if they were in motion before the eyes of Leonardo.



On the other hand, the monumental definition of the group formed of the Virgin and Saint Anne seems to reflect the concept developed by Leonardo in the personages of the *Last Supper*, painted in Milan during the last years of the 15th century. As compared to that work the cartoon with the silent dialogue, made up of the expressions and glances exchanged between the two women, along with the gesture of Saint Anne's hand, constitutes a sharp turn toward a more intimate, intensified atmosphere.

Moreover, the sculptural quality, which appears as the basic component of the figuration, suggests a direct reflection of the study of classical models; an experience that could date from a journey to Rome made by Leonardo in 1501 before returning to Florence. On that occasion, at Hadrian's Villa in Tivoli, he may have seen the majestic series of the *Muses* (now in Madrid, Prado Museum), great Hellenistic statues just unearthed in the first excavations conducted expressly during those years. Of the ancient example, Saint Anne and the Virgin reiterate the almost architectural structure, starting from the two heads placed one beside another, and the complex articulation in space with the dynamic play of the legs concealed by rich draperies.

In the cartoon, white lead highlighting is used to create the effect of relief on the forms; and, in still another analogy with sculpture, the two figures superimposed, or rather incorporated one within another, seem to belong to a single block of marble, along with the Child brought by encircling arms within the original core formed of the two mothers.







VIRGIN AND CHILD WITH SAINT ANNE AND A LAMB

This painting represents the solution at which Leonardo arrived after a long process of elaboration which is documented by the drawings and the cartoon now in London. As compared to the cartoon, the painting shows significant differences in its composition. The group consisting of Saint Anne holding in her lap the Virgin, her daughter, is structured as a pyramid; the two figures are no longer placed solidly side-by-side but are shown in more accentuated movement that generates oblique and opposed lines. In the graphic experimentation of his drawings, Leonardo portrays the two women as forms inseparable from each other, as if this were the simultaneous representation of two different positions assumed by a single person in successive stages. The group thus achieves a unitary synthesis that encompasses within it, intrinsically, the very principle of movement.

The figure of Saint Anne is the supporting axis of the com-

*Virgin and Child
with Saint Anne and a Lamb,*
1510-1513;
Paris, Musée du Louvre.



position, of which her head forms the vertex. The Madonna's figure is inscribed within the space created by the body of Saint Anne, who stretches out her bent arm and, as she turns her gaze to the right, twists her knees instead toward the left. The tension that enlivened the personage of the Virgin in the London cartoon is transposed here to that of Saint Anne. The Virgin leans forward, her body positioned according to the opposing diagonals of the legs and back, whose directions are reinforced by the lines of the neck and head, and those of her arms stretched out toward the Child.

The interaction of their glances and gestures circulates among the figures and seems to propagate like an echo, starting from Saint Anne, lowering her eyes to look down at the Virgin, who is leaning forward to take into her arms the Child who, turning backward, exchanges glances with his mother while he replicates the gesture of her arms, grasping the lamb's ears in his hands. On the faces of the three personages, the intense exchange of glances is accompanied by a barely hinted smile.

Already in the early 16th century Leonardo had drawn a cartoon, now lost, whose subject was the group of *Virgin and Child with Saint Anne and Lamb*. The symbolic meaning of the composition in which the figures are closely bound together is explained by a contemporary description: "The mother, almost rising from the knees of Saint Anne, grasps the Child to take him away from the lamb [a sacrificial animal] which signifies the Passion." The lamb represents sacrifice, the destiny of Christ from



which his mother, in an instinctive gesture, tries to save him, while the presence of Saint Anne alludes to the role of the Church, or that of Divine Grace which comforts the Mother and the Child. Leonardo brought this work with him from Italy to France, where the secretary of Cardinal Luigi d'Aragona reports having seen a picture "of the Madonna and her son who are sitting in the lap of Saint Anne and adds that the paintings shown them were "all most perfect." In reality the *Saint Anne* still has unfinished parts, such as a portion of the Virgin's blue drapery. This intricate drapery is further developed by Leonardo in a drawing, datable to the last year of his life when, as reported by a direct witness, his hand was no longer able to "color with that sweetness of before, although he still works at making drawings."

From the minute detail of the pebbles in the foreground, on which rest the nude feet of Saint Anne, there opens out behind the figures the vision of a timeless space in which the crags of mountains peaks are lost in an azure glow amid mists and streams. The indefinable distance is rendered through the greater intensity of the azure blue that permeates the entire landscape, in accordance with a practical precept formulated by Leonardo: "That which you intend to show five times further away, make it five times bluer." The phenomenon theorized in his writings occurs due to the interposition of air between the eye and the object observed, so that "the blue air makes the distant mountains appear blue."





SAINT JOHN THE BAPTIST

When Leonardo was already in France residing in the manor of Clos-Lucé at Cloux near Amboise, he received a visit from the Cardinal of Aragona, whose secretary wrote that he had seen on that occasion a picture “of Saint John the Baptist as a youth”, along with two other paintings that can be identified as the *Mona Lisa* and the *Saint Anne* now in the Louvre. Leonardo had thus brought this painting with him from Italy, and he kept it with him during the last years of his life. But the conception of the *Saint John* dates in all probability from the years when Leonardo was still in Florence, around 1508, when he collaborated with his friend the sculptor Giovan Francesco Rustici in designing the bronze group called the *Preaching of the Baptist*, destined to be placed above the north door of the Florentine Baptistery, dedicated expressly to Saint John. Leonardo must have contributed substantially to the planning of this sculptural work, with the saint at the center, between the Levite and the Pharisee, raising his right hand to point up-

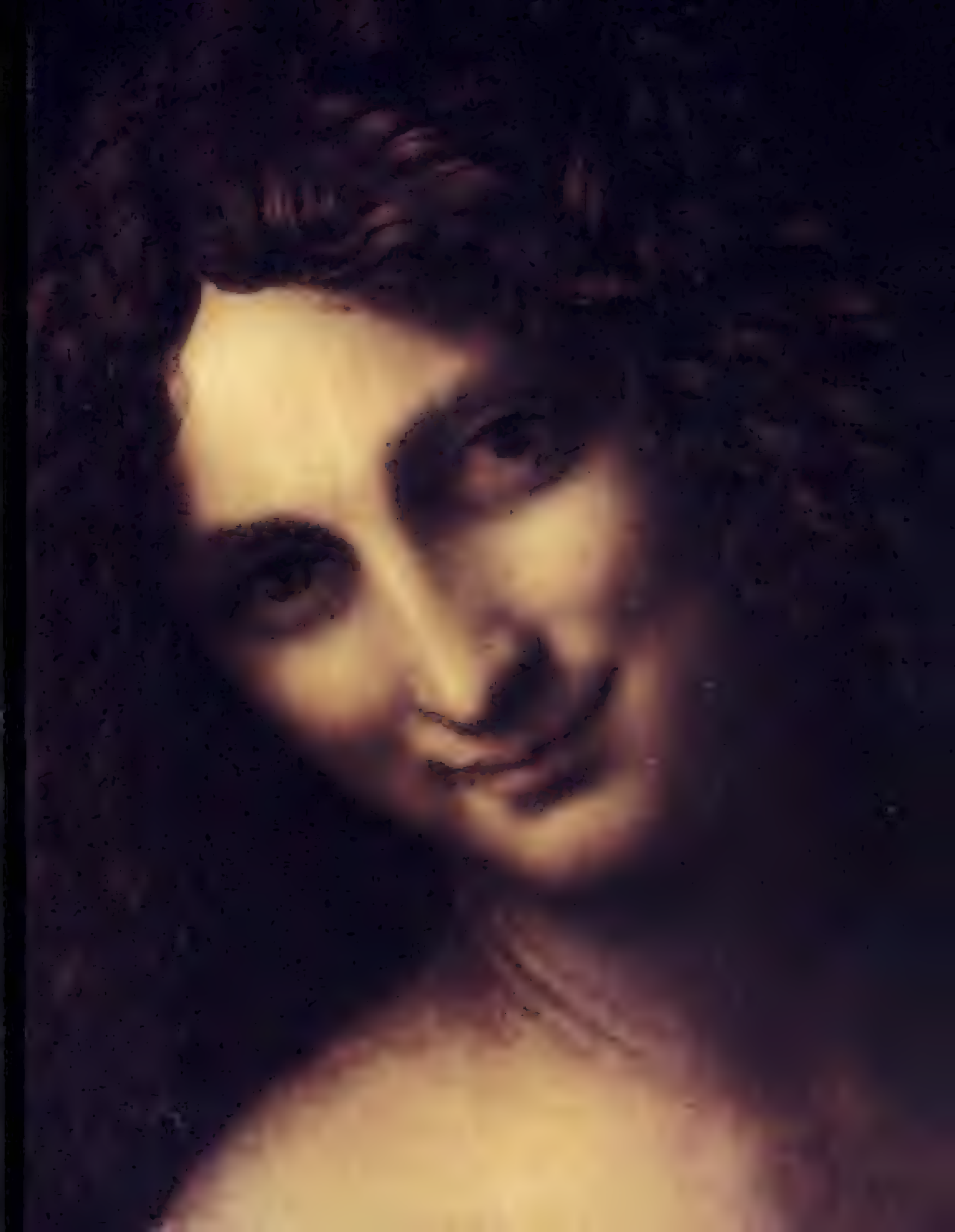
Saint John the Baptist,
1505-1507 or 1513-1516;
Paris, Musée du Louvre.



ward and thus alluding to the concept underlying his words. Vasari states, in regard to Leonardo, "In statuary he proved himself in three bronze figures" and specifies "sculpted by Giovan Francesco Rustici, but designed with the advice of Lionardo." Immediately prior to this reference to sculpture, Vasari considers Leonardo's contribution to painting, noting the introduction in his paintings of "a certain obscurity", which represents a crucially important innovation, adopted later by "modern" painters to confer, as Vasari states, "great strength and relief on their figures." That specific effect invented by Leonardo finds its demonstration expressly in this work, with the figure emerging gradually from the shadowy background; a method that proves highly effective for rendering in painting the sculptural three-dimensional nature of forms.

Saint John, with his enigmatic smile, emerges from the darkness; the light, coming from a source at the upper left, strikes the figure, revealing the articulation of the volumes by creating light surfaces and shadowy areas which contrast with each other and stand out in strong relief according to the principle expressed by Leonardo himself with great clarity, in formulating a kind of philosophic aphorism: "White with black, or black with white, the one appears more potent due to the other, and thus the opposites always appear stronger."

The parts of the body shrouded in shadow still remain visible and distinct against the undefined space of the background, and appear to suggest a reference to the concept of the *lumen cinereum* of the moon, that phenomenon due to



which the dark part of the moon emits a faint light, making it perceptible to the eye.

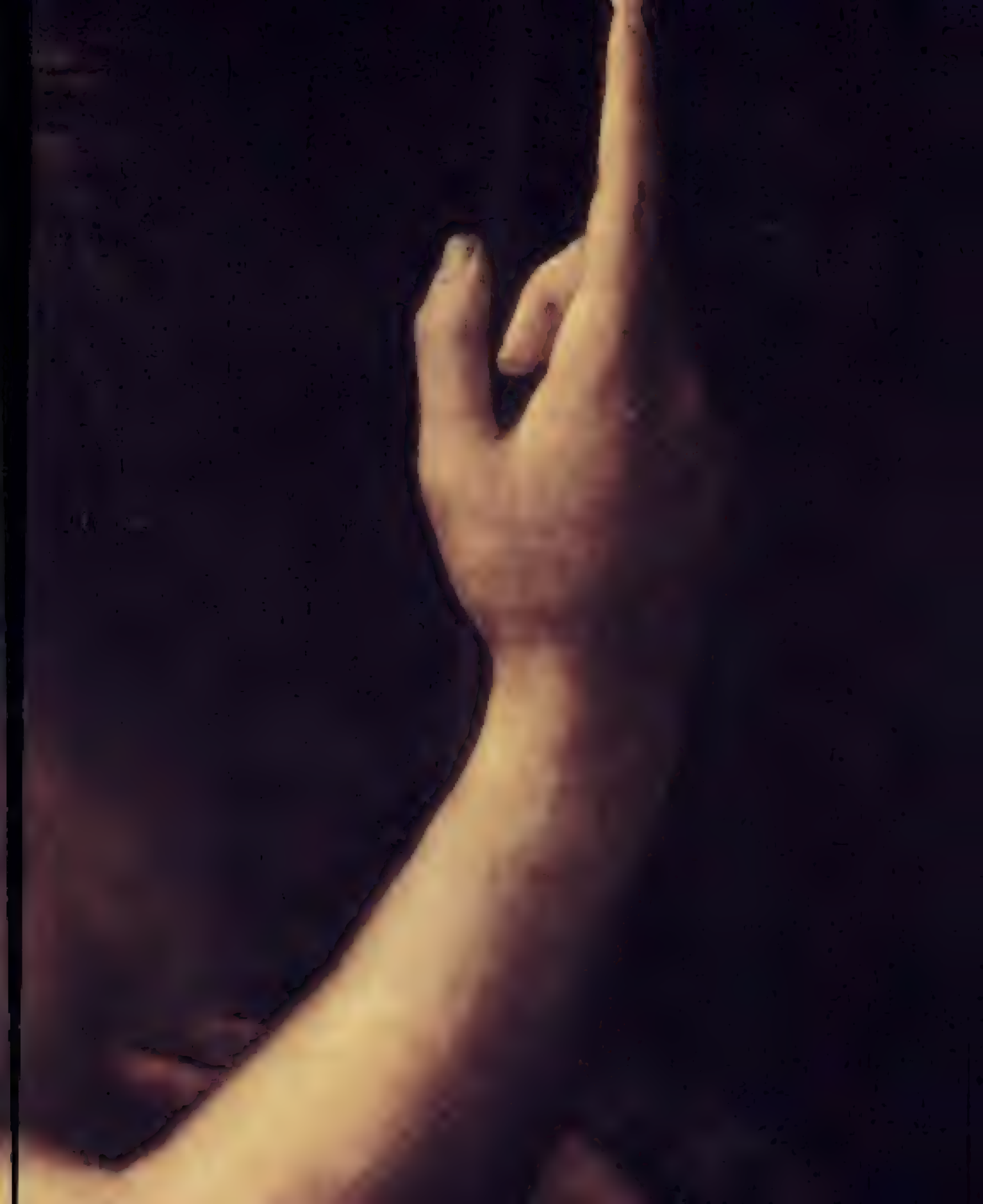
The three-quarters position of the figure emphasizes the projection of the shoulder and arm, which cuts through space in the foreground, designing an arc that terminates in the hand raised at the height of the face. The gesture of the finger pointing upward is symmetrically correlated to the allusive gaze of the personage. This is a recurrent attitude in Leonardo's paintings, establishing a consonance of gestures between Saint John the Baptist and the other personages linked to this gesture of alluding to a higher sphere. Already in the *Adoration of the Magi*, a figure from among the circle of onlookers was represented in the act of pointing upward; the same pose was later to distinguish Saint Thomas, and his expression of amazement, in the ensemble of mixed emotions that animates the *Last Supper*. And lastly the gesture, accompanied by the same intense gaze, returns in the *Saint Anne* of the cartoon in the London National Gallery. This is therefore a recurrent *topos*, which Raphael had already recognized as a trademark or distinctive feature of Leonardo's painting, so much so as to replicate it in his own portrait of Leonard represented as Plato appearing at the center of the *School of Athens* in the Vatican Stanze.

It is only in this painting, however, that the figure portrayed, with his allusive gesture, gazes directly at the observer; it is to him that Saint John addresses, without mediation, his message. This gesture reiterates an idea conceived by Leonardo for the image of an *Announcing Angel*; the



painting is now lost but has been documented by several versions and replicas by followers, as well as by a drawing on a sheet at Windsor done by a pupil. The angel turns directly toward the observer and is thus portrayed as if seen from the viewpoint of the Virgin, subjectively it might be said. Leonardo's invention seems to constitute the ideal correlative, as in a cinematic reverse angle, of the *Our Lady of the Annunciation* by Antonello da Messina (Palermo, Galleria Regionale della Sicilia).

As compared to the *Announcing Angel*, in the *Saint John* the figure's arm has completed its rotation, bringing it to rest against the chest, conferring depth on the various planes of the body. The figure incarnates the shining of light amid the shadows and the message he bears refers to something outside of the scene, which does not pertain to the sphere of the visible; an otherness that can only be evoked, since knowledge of it goes beyond the limitations of rational understanding. As regards the mind's ability to penetrate "through the universe", Leonardo declared, "but because it is finite it cannot reach the infinite."



BACCHUS (SAINT JOHN)

This work has been identified as the painting described as “Saint John in the desert” which in the first half of the 17th century formed part of the French royal family’s collection. The same picture was listed again in an inventory from the late 17th century in which it was defined specifically as “St. Jean au desert”, but the name was then deleted and replaced by that of “Bacchus dans un paysage” (Bacchus in a landscape). Leonardo’s original is thus to be found today under the subsequent additions and repainting that have transformed the sacred subject of the saint into the pagan one of the Greek god. The composition reflects that of a red chalk drawing by the hand of Leonardo, where the subject was studied in a pose distinguished by the dynamic crossing of the legs and the flowing movement of the arm. That drawing is today lost; it was kept in the Museo del Sacro Monte in Varese, from where it was stolen in 1973. The figure appeared seated on a rocky bench, with trees behind him suggesting flourishing vegetation.

Bacchus (Saint John),
1513-1515;
Paris, Musée du Louvre.



No information on the alterations undergone by the painting over the course of the centuries can be obtained by X-ray examination since the work, originally painted on a panel, was transposed onto canvas in the 19th century, and on that occasion was treated with ceruse (white lead), making it opaque to radiations. The most obvious additions consist however of the panther's skin draped around the waist and arm of the personage, and the crown of vine leaves. The cross too, held by the hand turned downward and to which the other hand points, must have been transformed into the thrysus of the myth at some point in time. It almost seems as if the transformation of the personage interpreted the ambiguity implicit since the very beginning in the iconography of this picture, which was probably painted by Leonardo with the collaboration of some of his pupils. The character conferred on *Saint John the Baptist*, portrayed not with the emaciated, suffering features of the traditional figure but through the sculptural rendering of the body's modeling, must have suggested the possibility of transforming it into the pagan god. In addition to the reference to classical examples for the typology of the nude and the head with its curly hair, Leonardo's innovative style emerges in the setting amid a landscape of flourishing vegetation, not the desolate scenario of a desert but the luxuriant one of primordial nature at the origins of life.







MONA LISA, OR GIOCONDA

The painting universally known as the *Mona Lisa*, or *Gioconda*, has always, over the centuries, been attributed without doubt to Leonardo; but at the same time it is still today an enigma as regards the identity of the woman portrayed. Her name has been subject to a vast number of widely varying hypotheses. Depending on the personage recognized in the portrait, moreover, hypotheses as to dating of the work and the place where it was painted must necessarily differ. Among the women who really existed and who could have been portrayed by Leonardo have been mentioned not only Monna Lisa del Giocondo, but also Duchess Costanza d'Avalos, Marchesa Isabella d'Este, the noblewoman Pacifica Brandano and Signora Gualanda.

The basic reference point is the story narrated by Vasari, from which comes the name that has always been attributed to the portrait: "Leonardo began to paint for Francesco del Giocondo a portrait of Monna Lisa his wife." Vasari goes on to specify that, "having worked on it for four

Mona Lisa, or Gioconda.
1503-1513 and later;
Paris, Musée du Louvre.



years he left it imperfect.” This information does not seem to concord with the report written by the secretary of the Cardinal of Aragon, who is thought to have seen the portrait in France on the occasion of a visit to Leonardo there. His secretary recorded the words he had heard spoken by the Master himself in relation to his paintings: “In one of the towns the Lord who was with us went to visit Messer Lunardo Vinci Florentine [...] most excellent painter in our times, who showed his Illustrious Lordship three pictures, one of a certain Florentine lady, done from life, at the instance of the late Magnificent Giuliano de Medici...” And so, according to information gathered directly from the elderly Leonardo, a year and a half before his death, it seems that the painting, perfectly finished, portrayed a Florentine woman and it was painted “from life” at the request of the late Giuliano de’ Medici. The reference to this member of the Medici family, under whose protection Leonardo had been during the years he spent in Rome, would advance the dating of the painting to after 1513, unless Leonardo had met Giuliano before then, perhaps at Venice in 1500, but certainly not in Florence, where the Medici had been driven out with the proclamation of the Florentine Republic. The discrepancy between the two sources could however find an explanation and lead to a single hypothesis. In Rome, perhaps commissioned expressly by Giuliano de’ Medici, who wanted to have a painting by him, Leonardo may have, instead of beginning a new painting, continued to work on that portrait he had begun in Florence. The *Gioconda*, in fact, may not have been consigned to those



who first commissioned it, the Del Giocondo family, considering that the portrait had remained unfinished, “imperfect” as stated by Vasari.

In this case the work would appear as the result of very lengthy elaboration, begun in the early years of the 16th century and worked on up to the last period of the artist’s life; a process of gradual completion carried out by Leonardo, who would have continued to work on the painting over the years, instilling in it the findings of his scientific research conducted during those same years. This would explain the multiplicity of elements appearing in the painting, from the reference to the *Portrait of Isabella d’Este*, dating from 1499-1500, for the hands and the torsion of the bust, resolved here however with the turning of the face suspended on the point of reaching the frontal position; up to the link with the artist’s subsequent geological studies, which are reflected in the landscape in the background where streams of water wind amid rocks and mountains

Above all, what Leonardo manages to encompass in the painting is the theme, elaborated in his writings, of the profound analogy between the microcosm of the human body and the macrocosm of the earth, both viewed as organisms pervaded by the flow of life. Along with representation through his anatomical studies, such as the one appearing in a complex drawing at Windsor, a study of the circulatory system in a woman’s body, Leonardo develops the theme of the “body of the earth”, describing it as follows: “The ramifications of veins of water are all conjoined together in this land like those of the blood.” The stream







that flows across the broad valley in the background thus alludes, with its incessant flowing, to the same perception of life that pulses, suggested through the rendering of the flesh, in the figure of the woman in the foreground, according to an almost hypnotic suggestion first mentioned by Vasari: "He who looks at her intently can see the beating of her pulse."

The painting becomes a cumulative image in which meanings and knowledge are superimposed in layers, analogous to the technique employed by Leonardo, which consisted of superimposing very fine layers of paint on the pictorial surface. The result, through its transparencies and indefinable nuances, clearly reflects the lengthy times of execution so congenial to Leonardo and reveals his inclination more toward the "never finished" than toward the "non-finished". These progressive layers of veiling, which render the brushstrokes invisible, produce the effect of a total fusion of colors and modulation sensitive to the light, conferring an impalpable, atmospheric quality to the flesh tones, the drapery and the landscape.

Just as the original inspiration for the portrait is based on a specific person, it has been observed that the landscape too probably stems from a precise location. The view that opens out behind the figure, in fact, closely resembles the valley through which flows the Chiana river in the territory around Arezzo. Starting from the left, its winding course meanders across the painting as far as the right side, where it flows into the Arno, immediately after having passed under the arcades of the medieval Ponte a Buriano, a bridge

still existing today. This is a territory that Leonardo had studied in detail, plotting, perhaps for Cesare Borgia, a *Map of the Val di Chiana* with precise indications on the mountain slopes and the distribution of water in the area. In the background of the painting, in the remote distance, the rocky cliffs seem to mirror the imposing formation of the eroded gullies in the Upper Valdarno.

The scenario unfolds in a broad birds-eye view, beyond a balcony, the bases of whose columns can be glimpsed at the edges of the picture, which must have been trimmed at the sides. And as is the case with the identification of the subject, the representation of the landscape too assumes in its pictorial transfiguration a significance reaching far beyond the factual data from which it started, to become condensed in the vision of the stratified layers of rocks subjected to the erosive action of water. The entire painting is pervaded by the concept of the flowing of time. As such, it reflects the latest developments in Leonardo's research, increasingly focused on dynamic aspects and on processes of transformation. The figure of the woman with her live presence immersed in the perennial becoming of nature embodies Leonardo's philosophical thought, "As the water you touch in rivers is the last [...] of that which went, and the first of that which is arriving, so is the present time."

The legendary smile of the *Mona Lisa* originated, according to Vasari, from the pretext of changing her melancholy expression, so that Leonardo, as he painted her portrait, surrounded the sitter with "people who played or sang, and made jokes continuously to keep her merry." In Leonardo's



elaboration, the smile becomes the sign of expressive mobility, alludes to the mystery of psychological depths and assumes the nature of the smile of knowledge. Leonardo thus brings to completion the evolutionary process of creating an idealized portrait.

The features of the *Mona Lisa* have been seen as directly related to those of Leonardo himself, and it has even been suggested that the painting could be a sort of self-portrait. But if the *Mona Lisa* can be called a self-portrait of Leonardo, it is surely because it represents the portrait of his concept of painting.

It might even be said that the *Mona Lisa* is a "self-portrait in the mirror", in the sense that the observer looks in the painting at that face before which the painter himself had stood at length. This is expressly the idea that Leonardo noted among his papers a year before his death, when he wrote, "That face which in painting gazed at the master who paints it, is always looking back at all those who gaze at it." As if to say that the *Mona Lisa* turns her gaze on the painter who has created her, returning his own gaze. In this intense, silent dialogue between the image and its author, he who observes the *Mona Lisa*, and is in turn gazed back at by her, stands in the place of Leonardo.







The drawings

It was through drawing that Leonardo conducted that experimentation with forms and compositions that was to be infused in all of the different spheres of his artistic activity: painting, sculpture and architecture. In the words of Giorgio Vasari, "And not only did he exercise one profession, but all of those in which drawing was involved." And in another passage, "Although he worked in such various fields, he never stopped drawing." In fact, drawing became for Leonardo the tool through which he was to conduct and record, in his papers, his scientific research extended to the most widely differing fields of knowledge. Drawing was a practice in which the intention of representation was indissoluble from the process of acquiring knowledge. The images created by Leonardo reflect research, experience, inventions and reflections, in keeping with the creative and cognitive processes of his mind; and thus in theoretical definition, visual language assumes for him the significance of "mental discourse".

Pupil of Leonardo,
Portrait of Leonardo da Vinci,
first half of the 16th century;
Windsor, RL 12726.

DRAWINGS IN ITALY

FLORENCE, GALLERIA DEGLI UFFIZI, GABINETTO DEI DISEGNI E DELLE STAMPE

In Florence, at the Uffizi, is the earliest known drawing by Leonardo, done by him at the age of twenty. It is a birds-eye view sweeping over a vast plain bordered on the left by a fortified citadel and on the right by a gorge from which springs a waterfall. The water collects below and the landscape, scored and eroded by courses of water, already seems to presage those processes of slow transformation of a territory that were to be the subject of Leonardo's last reflections on nature. The rapid brushstrokes, horizontal or curved, with which the trees are indicated recreates the atmospheric perception of the leaves that seem to vibrate in the air and in the light. The drawing may have been executed by Leonardo directly on the site, outdoors (*en plein air*) considering that it was done in pen without any underly-

Study for head of a Young Woman,
1475-1480, no. 5r [428E r];
Florence, Gabinetto dei Disegni
e delle Stampe degli Uffizi.



ing sketch, on a summer's day of which he himself recorded the date in the inscription at upper left: "day of St. Mary of the Snow / August 5, 1473." The observation point seems to be from the slopes of Monte Albano in the vicinity of his native Vinci.

The *Head of a Young Woman*, viewed almost in profile, in a reclining pose, with eyes half-closed and a face framed in waving hair, recalls the Virgin in the little panel of the *Annunciation* at the Louvre; while the motif of the *Facing busts of an old man and of an adolescent* is reiterated on a sheet of notes with *Two sketches of heads in profile* in which the typologies of the old man with frowning expression and that of a youth seen foreshortened are compared. On the same sheet, the mechanism illustrated is a braking device applied to a wheel.

The *Studies of drapery* were executed according to a common practice in the Florentine workshops, which consisted of making "models of figures in clay" on which were draped "damp clayey rags", cloths soaked in water and clay to allow better modeling of the folds. These models were then reproduced by brush on linen supports. Vasari speci-

*Study from life for the
'Madonna with a Cat'.*

1480-1483, no. 10r [421E r];

Florence, Gabinetto dei Disegni
e delle Stampe degli Uffizi.



fies that Leonardo “patiently engaged in painting them on certain very fine canvases”, and states that “he worked in black and white with the tip of the brush, which was a miraculous thing.” The examples known today of these extremely accurate exercises in representing reality (almost photographic reproductions), are shared by the Uffizi, the Louvre, the British Museum and other museums. The grazing light falls from above on the folds, which emerge from the uniform background and the monochromatic rendering confers higher relief on the alternation of light and dark areas. The studies of the kneeling figure and the seated one can be seen in relation to the personages of the Virgin and the Angel in the *Annunciation* at the Uffizi.

In the *Study for the background of the ‘Adoration of the Magi’* the tiers of steps in the foreground, emphasized by touches of white lead, introduce the observer into a space defined by a rigorous perspective grid; this determines the architectural structure with pillars, arches and stairways at the top on which the figures are thronged. In the Uffizi painting, which remained unfinished, Leonardo adopted a solution for rendering space, which goes beyond the limitations of linear perspective.

Study of drapery

for an erect figure,

c. 1478, no. 4r [433E r];

Florence, Gabinetto dei Disegni
e delle Stampe degli Uffizi.





*Study of drapery
for a kneeling figure,*
c. 1478, no. 3r [420E r];
Florence, Gabinetto dei Disegni
e delle Stampe degli Uffizi.

*Study of drapery
for a seated figure,*
c. 1478, no. 2r [437E r];
Florence, Gabinetto dei Disegni
e delle Stampe degli Uffizi.



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Scenery



Don. Giovanni



On pp. 262-263:
*Landscape with
 the view of the Arno,*
 1473, no. 1r [8P r];
 Florence, Gabinetto
 dei Disegni e delle
 Stampe degli Uffizi.

On pp. 264-265:
*Study for a landscape
 with a view of the Arno
 and studies of figures,*
 1473, no. 1v [8P v];
 Florence, Gabinetto
 dei Disegni e delle
 Stampe degli Uffizi.

*Two sketches of heads
 in profile, notes and
 details of mechanisms;*
*at the center, a braking
 device applied to a wheel,*
 1478, no. 7r [446E r];
 Florence, Gabinetto
 dei Disegni e delle
 Stampe degli Uffizi.







*Studies of machines:
device for stretching
a bow and belt
for conveying buckets,
1478, no. 7v
[446E v];
Florence, Gabinetto
dei Disegni e delle
Stampe degli Uffizi.*





*Studies for a flying machine
and other mechanisms,*

c. 1480, no. 9v [447E v];

Florence, Gabinetto dei Disegni
e delle Stampe degli Uffizi.

*Studies of figures, notes,
mechanical devices.*

c. 1480, no. 9r [447E r];

Florence, Gabinetto dei Disegni
e delle Stampe degli Uffizi.

On pp. 272-273:

*Study for the background
of the 'Adoration of the Magi',*

c. 1480, no. 8r [436E r];

Florence, Gabinetto dei Disegni
e delle Stampe degli Uffizi.







TURIN, BIBLIOTECA REALE

The famous *Self-portrait* in Turin is a large red chalk drawing that shows us how Leonardo must have looked in the last years of his life, after the age of sixty, although the old man portrayed in the drawing appears somewhat older. If the self-portrait of Leonardo at the age of nearly thirty may be identified in the figure on the far right in the Uffizi's *Adoration of the Magi*, the features of Leonardo at the age of sixty resemble those of an ancient philosopher; the same, then as those shown in the figure of Plato painted by Raphael in the Vatican Stanze, portraying Leonardo in a personification that attributes to his face, through its physical characteristics, the significance of the conquests of the human mind. And it is just in this manner that a late 16th century description depicts Leonardo: "He had a face with long hair, with the eyebrows and the beard so long that he seemed the true nobility of study, as was in other times the druid Hermes or the ancient Prometheus."

Self-portrait,
c. 1515, no. 1r [15571r];
Turin, Biblioteca Reale.



On pp. 342-343:
*Drawings
for a theatrical set,*
c. 1495-1496, no. 9v;
New York, The Metropolitan
Museum of Art.

Profile of a Man,
c. 1495, no. 10r;
New York, The Metropolitan
Museum of Art.



sheet a simultaneous vision from different points of view. The multiple representations provide at a single glance the knowledge of the subject that would be acquired in moving about it. The head with its thick beard, shown frontally, in three-quarter view and in profile, may be the portrait of Cesare Borgia.

The *Study for a Hercules with the Nemean lion* reflects the typology of the warrior elaborated by Leonardo during the years he spent in Florence working on the *Battle of Anghiari*; the powerful figure is seen standing, viewed from the back to emphasize the relief of the bulging muscles. Also inspired by models of ancient sculptures is the *Herculean profile of a warrior*. The head with its fierce, proud expression is crowned with a laurel wreath and on the left, beside the line of the neck and along with the last curls of the hair, we discover that Leonardo has traced, like a cryptic cipher, the letter “L”.

*Portrait of a young woman,
study for the angel in the first
version of the 'Virgin of the Rocks',
c. 1483-1485, no. 2r [15572r];
Turin, Biblioteca Reale.*

On pp. 280-281:
*Armed chariots and warriors
with cut up limbs,
1487-1490, no. 14r [15583r];
Turin, Biblioteca Reale.*

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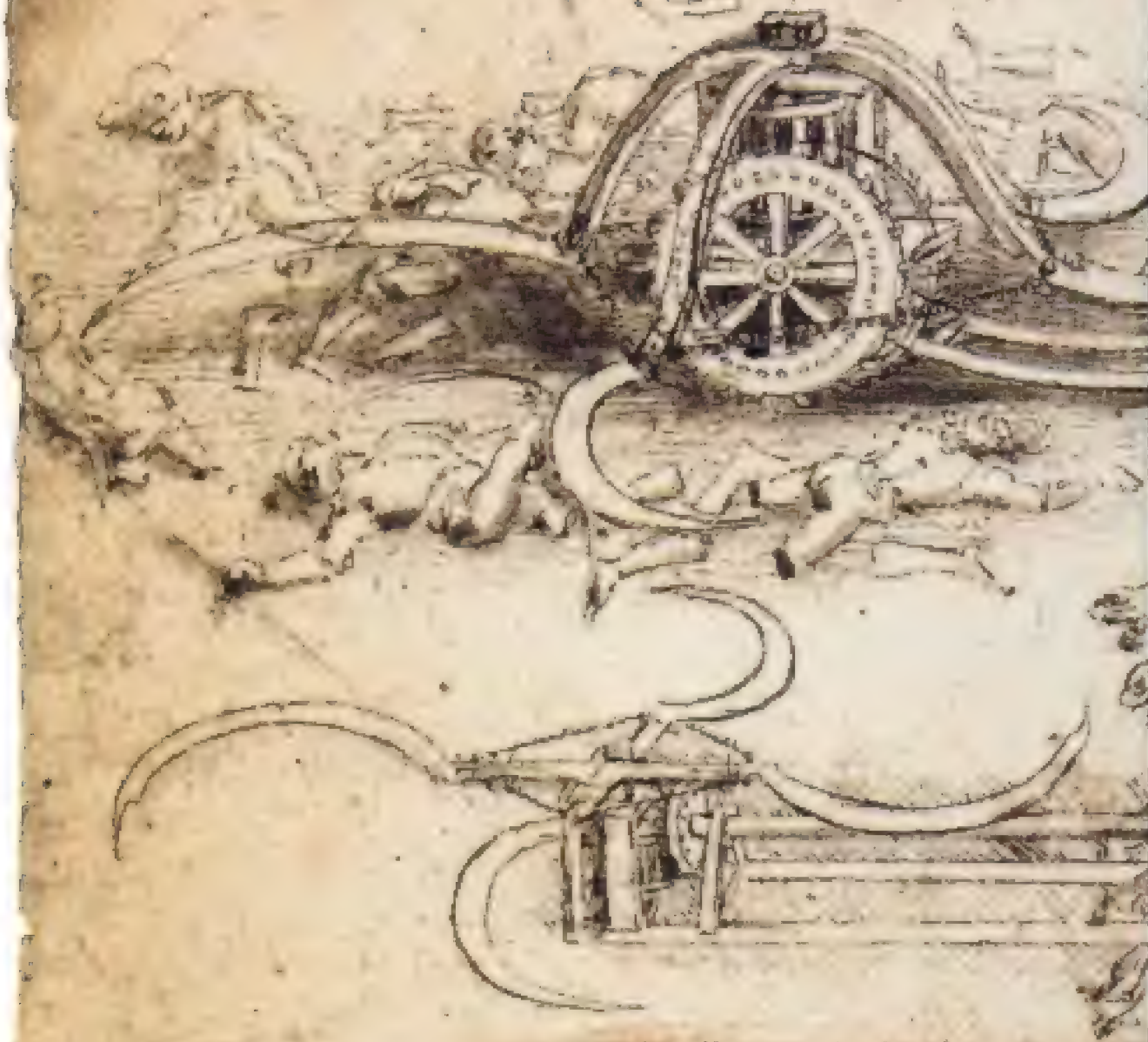
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*Portrait of a young woman,
study for the angel in the first
version of the 'Virgin of the Rocks',
c. 1483-1485, no. 2r [15572r];
Turin, Biblioteca Reale.*

On pp. 280-281:
*Armed chariots and warriors
with cut up limbs,
1487-1490, no. 14r [15583r];
Turin, Biblioteca Reale.*

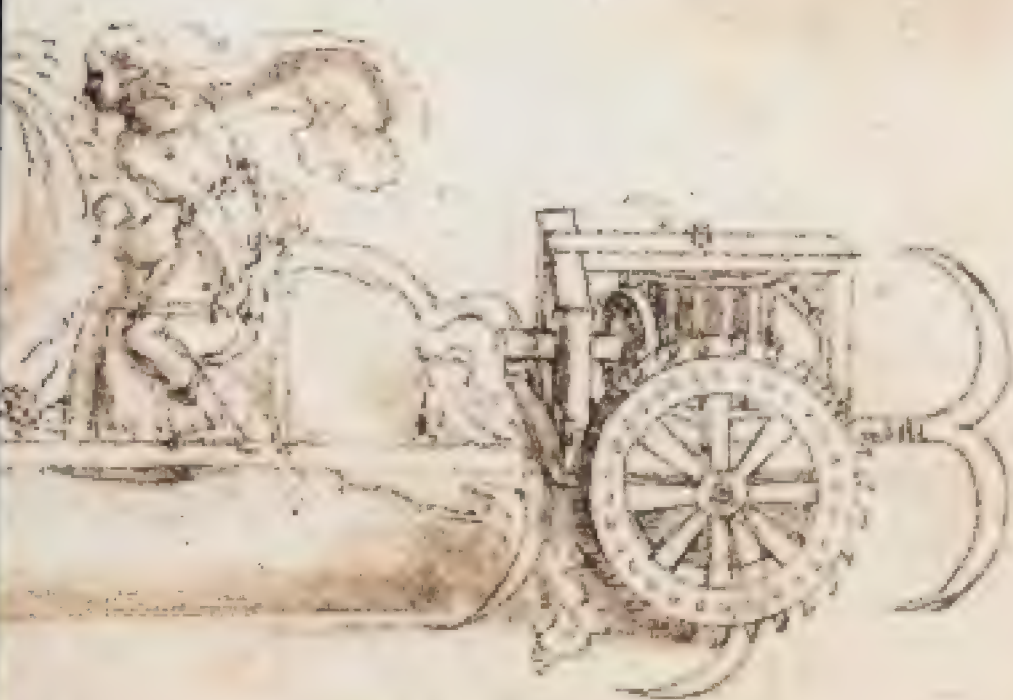


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Studies of insects,
c. 1480, no. 13r [15581r];
Turin, Biblioteca Reale.

Studies of horse's hind legs,
for the 'Monument to Francesco Sforza',
c. 1490, no. 12r [15582r];
Turin, Biblioteca Reale.



*Studies of horse's
forelegs, for the
'Monument
to Francesco Sforza',
c. 1490,
no. 11r [15580r];
Turin,
Biblioteca Reale.*





*Study of horse's
forelegs, for the
'Monument
to Francesco Sforza',
c. 1490,
no. 10r [15579r];
Turin, Biblioteca Reale.*

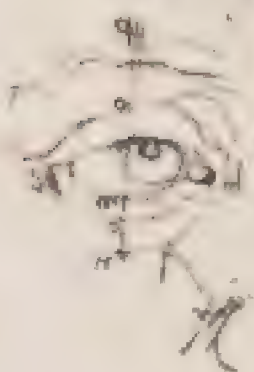
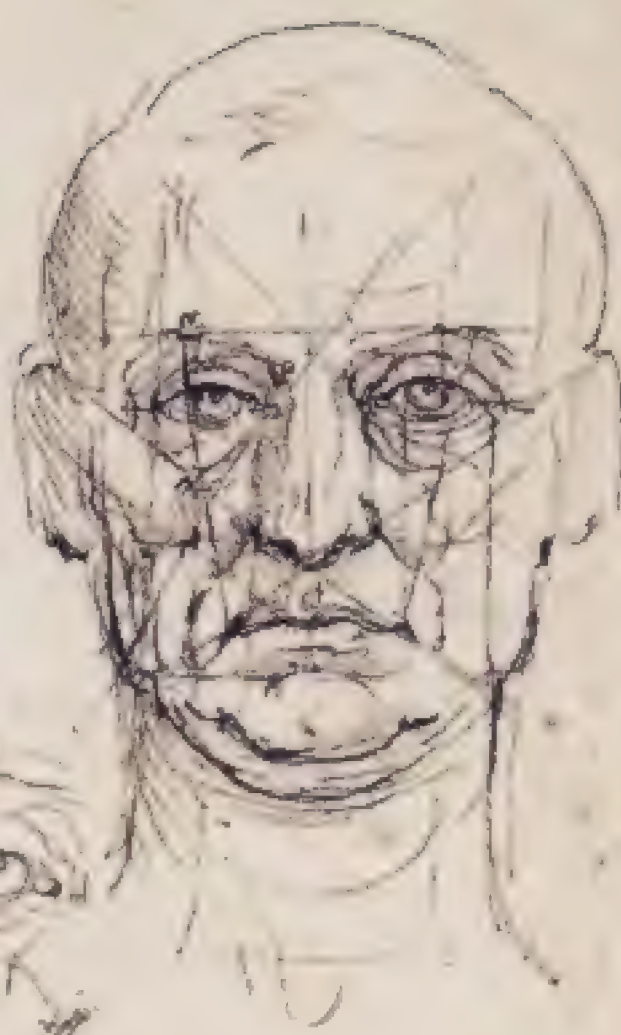




*Study of proportions
of the face with details
of eyes, notes and some
arithmetical operations,*
c. 1489-1490,
no. 4r [15574r]-
no. 5r [15576r];
Turin,
Biblioteca Reale.



1) 1000 1/2 1/2 1/2 1/2
 2) 1000 1/2 1/2 1/2 1/2
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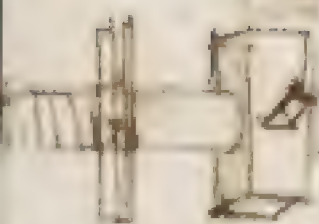
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 8) 1000 1/2 1/2 1/2 1/2
 9) 1000 1/2 1/2 1/2 1/2
 10) 1000 1/2 1/2 1/2 1/2

4 4
 12
 27
 3

12
 12
 24



*Technological
studies: device
similar to a drill
and device
for making screws,
c. 1489-1490,
no. 4v [15574v]-
no. 5v [15576v];
Turin,
Biblioteca Reale.*





*Three views of the same
bearded head, presumed
to be a portrait
of Cesare Borgia.*

1502, no. 3r [15573r];
Turin, Biblioteca Reale.

On p. 294:
*Study of a Hercules
with the Nemean lion.*

1505-1506, no. 8r [15630r];
Turin, Biblioteca Reale.

On p. 295:
*Herculean profile
of a warrior.*

c. 1508, no. 6r [15575r];
Turin, Biblioteca Reale.



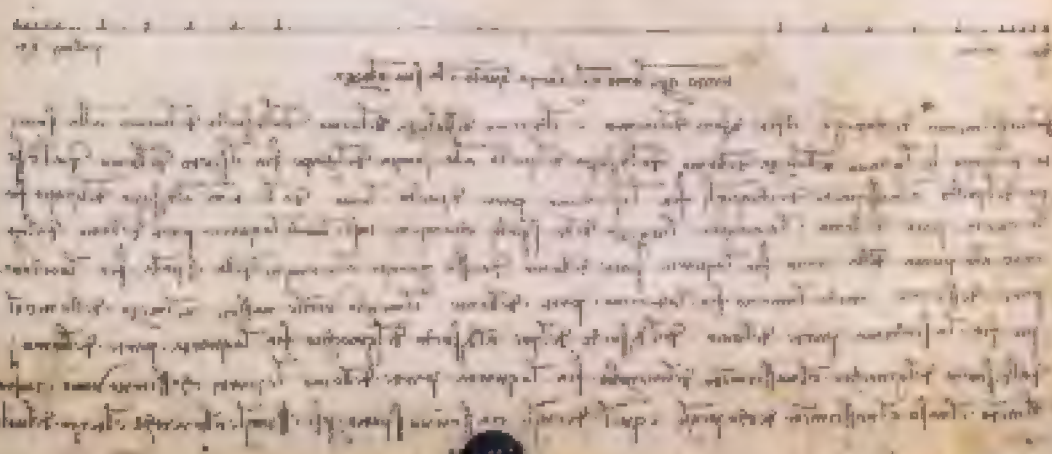




VENICE, GALLERIE DELL'ACCADEMIA

The representation of the *Homo Vitruvianus*, at the Accademia in Venice, is a paradigm of the proportions of the human body. It dates from the years around 1490 when Leonardo, in Milan, was engaged in studying and measuring the various parts of the body, considered both in mutual correspondence to one another and in relation to the whole. The text under the drawing reads: "The span of a man's open arms is equal to his height", and the image shows that the proportional relationships of the human body correspond to those employed in constructing geometric figures. Consequently, according to the theory set forth by Vitruvius (the Roman architect author of *De architectura*), the figure of man can be inscribed in a circle as well as in a square, appearing as the model of perfection and harmony. This model is assumed as the basis for architectural designing and is reflected in the classical ideal, celebrated in the Renaissance, of the building with circular

Homo Vitruvianus:
studies of proportions of the
human body according to Vitruvius,
c. 1490, no. 6r [228r];
Venice, Gallerie dell'Accademia.



plan. But, in addition to the rigorous measurement of the limbs, the representation of the human body conceived by Leonardo already implicates an evolution that departs from the static principle of proportions, because it contains in itself the concept of motion. The man with two pairs of arms and legs immediately conveys the kinetic effect of the transition from one position to the other taking place in two successive stages.

The drawing in Venice, a study relevant to the arrangement of the figures in the group of the *Virgin and Child with Saint Anne*, where the Child is playing with a lamb, differs from the solutions preferred by Leonardo in the cartoon in London and in the painting in Paris. Here the Virgin is, in fact, viewed from behind, seated in the lap of Saint Anne, who is shown in two different stages of a single movement. Leonardo sketched the *Studies of horsemen* freely in red chalk on a sheet where he had previously drawn the profile of a man with a diagram of proportions. The horsemen derive from preliminary ideas for the *Battle of Anghiari*, and the one on the right seems to echo the study of proportions made almost fifteen years earlier.

*Madonna and Child
with Saint Anne and a Lamb,*
c. 1501, no. 14r [230r];
Venice, Gallerie dell'Accademia.



Still linked to studies for the composition of the *Battle of Anghiari* are the sketches that Leonardo traced with great rapidity in a series of *Skirmishes of horsemen*. The small figures appear as if stenographed, barely sketched with a few strokes of the pen that serve to translate ideas into images almost instantaneously.

The *Three dancing women* convey a remarkable sense of movement, expressing with the rhythm of their gestures, with their tousled hair and windblown gowns, the flowing motion of bodies caught up in the dance and in the wind. These figures call to mind the animated style of some examples of ancient sculpture, as well as the intention with which Leonardo, in the late drawings of the *Deluge*, renders visible the driving impetus of the forces of nature.

The concept of rendering in a drawing the impression of movement pervades all of Leonardo's graphic work and can already be recognized in his youthful project for a scene of the *Nativity watched over by angels in flight*, pervaded by a remarkable sense of dynamism.

Study of proportions,
c. 1490,
and *Studies of horsemen*
for the 'Battle of Anghiari',
added around 1503-1504,
no. 7r [236r];
Venice, Gallerie dell'Accademia.

Study for a 'Nativity'
watched over by flying angels,
c. 1480, no. 1r [256r];
Venice, Gallerie dell'Accademia.

On p. 304:
Studies of weapons:
spear points for combat
between horsemen and foot soldiers,
c. 1485, no. 4r [235r];
Venice, Gallerie dell'Accademia.

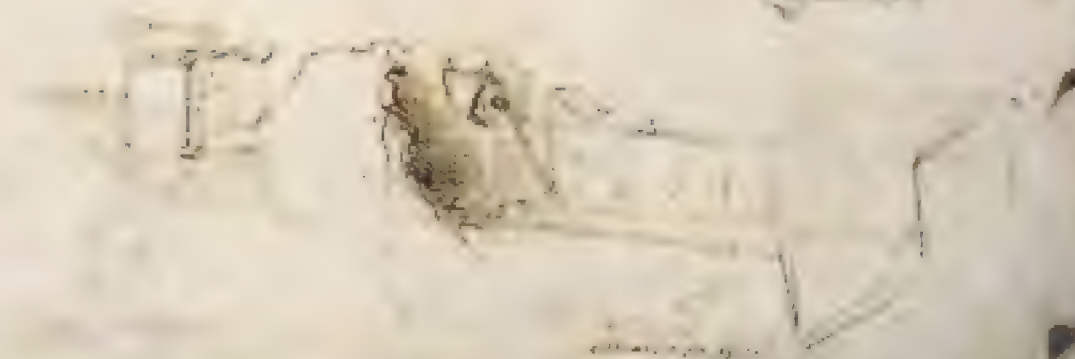
On p. 305:
War machine,
c. 1485, no. 4v (235v);
Venice, Gallerie dell'Accademia.







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*Study of a man's
head in profile
with mocking sneer
as in a 'Christ
bearing the Cross',
1493-1494,
no. 12r (232r);
Venice, Gallerie
dell'Accademia.*

On p. 307:
*Study for a 'Christ
bearing the Cross',
c. 1495-1497,
no. 11r [231r];
Venice, Gallerie
dell'Accademia.*







*Preliminary studies for the
 'Battle of Anghiari': two skirmishes
 between horsemen and foot soldiers,
 c. 1503-1504, no. 16r [215A r];
 Venice, Gallerie dell'Accademia.*

*Preliminary studies for the
 'Battle of Anghiari': skirmish of horsemen
 and studies of human movements,
 1503-1504, no. 15r [215r].
 Venice, Gallerie dell'Accademia.*





*Study of a horse
and two figures,
c. 1517-1518, no. 25r [258r];
Venice, Gallerie dell'Accademia.*



*Three figures of dancing
women and a head,
c. 1515, no. 26r [233r];
Venice, Gallerie dell'Accademia.*



MILAN,
BIBLIOTECA AMBROSIANA

ROME,
GABINETTO NAZIONALE
DELLE STAMPE E DEI DISEGNI

The *Profile of a Young Woman* at the Ambrosiana in Milan is distinguished by the great regularity and delicacy of the features, almost as if the drawing started from the tracing of a perfect circle on which to model the outline of the face. The image created in this way is in striking contrast to the *Caricature studies* in the Gabinetto delle Stampe e dei Disegni in Rome, where the representation insists on the accentuated, projecting features of the face and focuses on the characteristic signs of old age. Leonardo's numerous drawings of grotesque heads may be linked to his research on the expressions of the face, involving physiognomy (the traits that vary according to emotions) and pathognomy (the permanent traits), two fields of investigation that, within the sphere of anatomical studies, correspond to a complex definition of the relationship between body and soul.

Profile of Young Woman,
c. 1490, F 274 Inf. 14;
Milan. Biblioteca Ambrosiana.





*Caricature study
of an Old Man,*
1490-1495, no. 8r;
Rome, Gabinetto
Nazionale Disegni
e Stampe.

*Caricature profile
of an Old Man,*
1490-1495, no. 8v;
Rome, Gabinetto
Nazionale Disegni
e Stampe.



DRAWINGS IN EUROPE

Numerous drawings by Leonardo are to be found in Europe's most important museums. At the British Museum the majestic *Profile of a Warrior* is a youthful work in which Leonardo reflects the inspiration of ancient models and the marble bas-reliefs sculpted by his master Verrocchio. The *Allegory of Victory and Fortune* also dates from his first Florentine period. Here Leonardo represents, with incisive strokes of the pen, a winged figure, Victory or Fame, balanced above a shield held up by Fortune, recognizable by her hair blown forward by the wind.

At the Fitzwilliam Museum in Cambridge the *Study of Horses* and riders with its symmetrical, almost mirror-like arrangement, is a preparatory drawing for the figures thronging the background in the *Adoration of the Magi*. In this same museum, the *Allegory of the Ermine* depicts the scene of the little animal that lets itself be captured rather than soil its coat with mud, which the hunter has spread around its den to catch it. It may be viewed in reference to

Profile of a Warrior.

1475-1480, no. 1895-9-15-474;

London, British Museum.



the *Portrait of Cecilia Gallerani* (known as the *Lady with the Ermine*) painted in Milan for Ludovico il Moro, of whom the white-coated animal was the emblem.

The rich collection of the Département des Arts Graphiques of the Musée du Louvre includes, among others, the precious *Studies of drapery* drawn on linen. Another *Study of drapery* refers to the figure of the Virgin in the *Saint Anne* painting in the Louvre. This is one of the last drawings of Leonardo in which the gathering of the folds seems to resemble that of clouds or swirling water.

Leonard's complex elaboration of the theme of the *Leda* is reflected in the two drawings at Chatsworth and Rotterdam; in both, but with different modulation, the woman's figure is rendered in a dynamic, spiraling pose, and is caught in the act of rising from a kneeling position, with the swan on one side and the two pairs of twins emerging from their broken eggs on the other.

At Weimar, a folio of *Anatomical studies* contains the striking exploded view of an open cranium, with the brain, the ocular bulbs and the nerves ("all of the nerves that descend from the brain"). To realize this model, Leonardo applied

Allegory of Victory and Fortune,
c. 1480, no. 1895-9-15-482;
London, British Museum.



the technique of injecting into the canals molten wax, which when hardened showed their conformation.

In the *Heads of Warriors* now in Budapest, Leonardo displays all of the impetuous fury of the battle. These are the preparatory studies for the personages portrayed in the skirmish of horsemen that was to form the central episode of the *Battle of Anghiari*, the great mural decoration for Palazzo Vecchio in Florence which was never finished by Leonardo. On the faces of the warriors can be seen the anguish of human beings overwhelmed by violence in the raging fury of war, which Leonardo called in his writings “discord, or rather most bestial madness.”

Study of crabs.
c. 1480, no. Z2003v;
Cologne, Wallart-Richartz Museum.

On p. 324:
*Study of figures and, at the
upper center, hygrometer,*
c. 1478-1480, no. 2022r;
Paris, Musée du Louvre.

On p. 325:
Anatomical studies,
c. 1478-1480, no. 2022v;
Paris, Musée du Louvre.



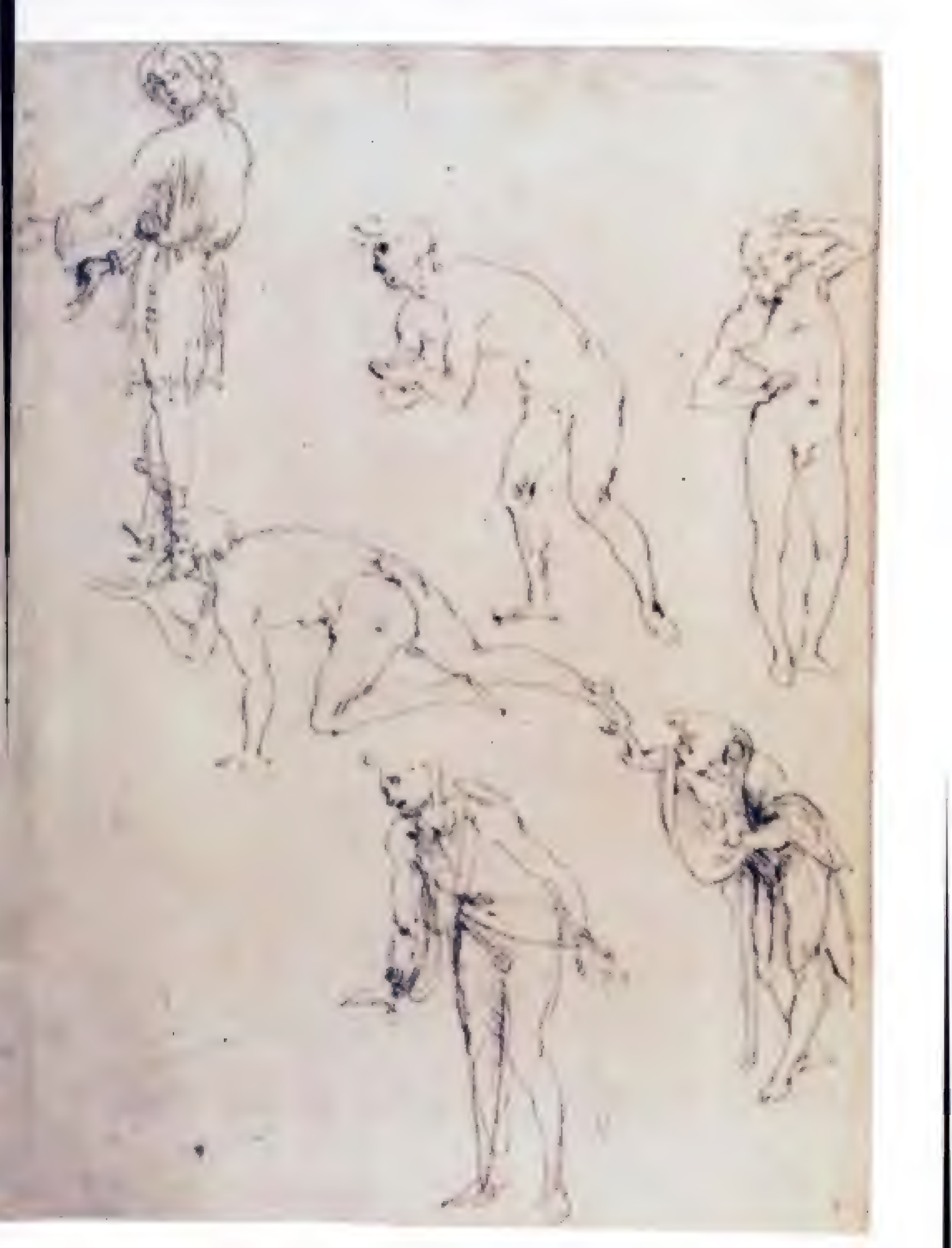


*Allegory
of the ermine,*
c. 1490, no. PD.120-1961;
Cambridge, Fitzwilliam Museum.

*Study of horses and riders
for the 'Adoration of the Magi',*
c. 1480, no. PD. 121-1961;
Cambridge, Fitzwilliam Museum.



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*Imaginary reconstruction
of an Etruscan tomb,
with view from the outside,
layout and underground
chamber,*

c. 1507, no. 2386;
Paris, Musée du Louvre.







*Study of drapery for the
figure of a seated woman,*
c. 1478, no. 2255;
Paris, Musée du Louvre.

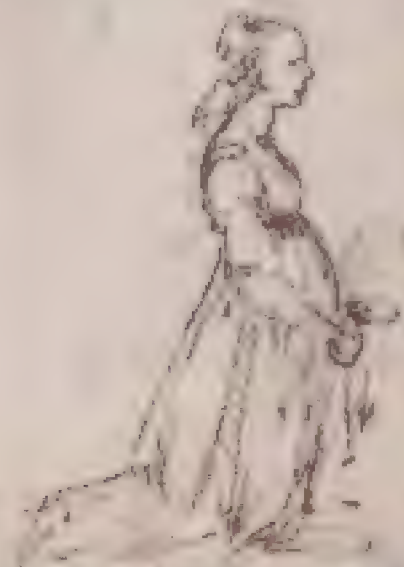
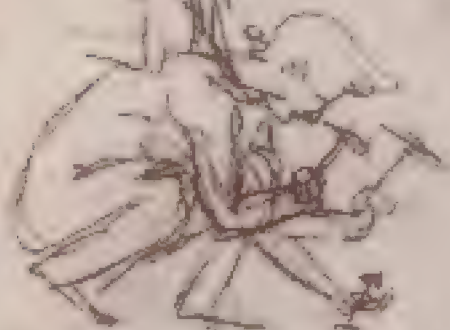
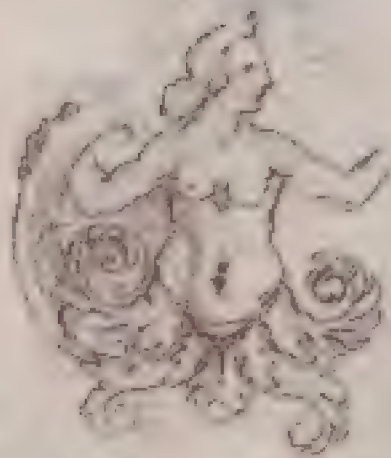
*Study of drapery
for the 'Saint Anne',*
c. 1517-1518, no. 2257;
Paris, Musée du Louvre.



The Hanged Man
(Portrait of Bernardo
di Bandino Baroncelli).
 1479, no. AI 659; NI 1777;
 Bayonne, Musée Bonnat.

Studies of figures
and ornamental motifs
inspired by antiquity (Siren),
 c. 1480, no. AI 660; NI 1778;
 Bayonne, Musée Bonnat.







Leda with the Swan,
c. 1504, no. 1466;
Rotterdam, Museum
Boymans-van Beuningen.

Engraving by Giovanni
Vendramini, 1812,
taken from the original
before restoration.

Study for a kneeling 'Leda',
1503-1504, no. 880/717;
Chatsworth, Duke of
Devonshire's Collection.





*Study for the heads of two Warriors
for the 'Battle of Anghiari',
c. 1504, no. E.I. 5/A [1775];
Budapest, Szépművészeti Múzeum.*

*Study for the head of a Warrior
for the 'Battle of Anghiari',
c. 1504, no. E.I. 5/r [1774];
Budapest, Szépművészeti Múzeum.*





*First idea for the figure
of the Apostle Peter for the 'Last Supper',
c. 1490, no. 17614;
Vienna, Graphische Sammlung Albertina.*

*Caricature study of
Curly-headed Man,
c. 1515, no. 0033;
Oxford, Christ Church College.*

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DRAWINGS IN AMERICA

At the Pierpont Morgan Library in New York, the drawing of a *Head of a Youngman* was done by Leonardo from a young male model; perhaps originally conceived for an angel, this study was to be used by him for the face of the Virgin in his youthful painting of the *Annunciation* in the Uffizi, as demonstration of how the ideal of beauty can be freely transposed from one subject to another in artistic elaboration.

Still in New York, at the Metropolitan Museum, the *Studies for a Nativity* reflect some ideas for composition from the *Virgin of the Rocks*, with the Madonna's arms opening to encompass the meeting between the Christ Child and the infant Saint John. The *Allegory of the Lizard* shows the reptile fighting a snake to defend a sleeping young man. A note explains that the lizard, if it is unable to defeat the snake, runs "onto the face of the man and awakens him." On the back of the same sheet is a project for a theatrical stage set: the layout and elevation of a structure with a barrel-vaulted ceiling, with a figure seated on a throne surrounded by flames.

Head of a Young Man,
study for the Virgin's head
in the Uffizi 'Annunciation',
c. 1475, no. IV, 34a;

New York, Pierpont Morgan Library.





Studies for a 'Nativity',
c. 1490, no. 7r;
New York, The Metropolitan
Museum of Art.

Allegory of the Lizard,
c. 1495-1496, no. 9r;
New York, The Metropolitan
Museum of Art.

Handwritten text in a cursive script, likely a title or description, located at the top of the page.



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$2 \cdot 1 \cdot 2 \cdot 3 \cdot 1 \cdot \frac{1}{2} \cdot 1$

$3 \cdot \frac{1}{2} \cdot 2 \cdot 1 \cdot 2 \cdot \frac{1}{2}$

$2 \cdot 1 \cdot 2 \cdot 3 \cdot 1 \cdot 1$

$2 \cdot 2 \cdot 1 \cdot 2$

$\frac{1}{2}$

$\frac{1}{2}$

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On pp. 342-343:
*Drawings
for a theatrical set,*
c. 1495-1496, no. 9v;
New York, The Metropolitan
Museum of Art.

Profile of a Man,
c. 1495, no. 10r;
New York, The Metropolitan
Museum of Art.



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Handwritten text in a cursive script, likely a letter or a page from a manuscript. The text is written in a dark ink and is somewhat faded and difficult to read. It appears to be a personal or official communication.





XII







The Collections

The *Codex Atlanticus* and the *Windsor Collection* are two great miscellaneous collections containing original drawings, texts and notes by Leonardo. These collections were created by the sculptor Pompeo Leoni, who purchased in Milan a large quantity of material by the hand of Leonardo: the manuscripts and drawings that Leoni took to Spain, where he was court artist, in 1590. Leoni manipulated this vast heterogeneous material by cutting out parts of it and isolating fragments, which he then redistributed and re-assembled, pasting the fragments on blank pages to form volumes. Some of these pages have an opening in them, like a window, to show both sides of the original sheet pasted on them. The drawings and writings that make up the collections reflect Leonardo's incessant graphic and theoretical elaboration, encompassing all of the spheres of his research and covering a vast span of time, from the earliest years of his activity in Florence up to the last period of his life in France.

Ambrogio Figino,
Portrait of Leonardo,
c. 1590;
Venice, Gallerie dell'Accademia.

CODEx ATLANTICUS

Milan,

Biblioteca Ambrosiana

This is the most imposing and spectacular collection of papers by Leonardo. Pompeo Leoni composed it by putting together on 401 pages (65x44 cm) a total of 1,750 pieces, including sheets and fragments. Subsequent to restoration, conducted in the Sixties and Seventies, it appears today re-composed in 12 volumes, but the old binding enclosed the entire content in a single volume of gigantic size, an atlas indeed. Already in the 18th century this exceptional document of Leonardo's material was described as "Codex of his papers in Atlas form." It was donated to the Ambrosiana in 1637 by Count Galeazzo Arconati, who had bought it from the heirs of Pompeo Leoni along with other codices of smaller size, which he also donated to the library. But in 1796, with the entry of French troops into Milan, the great book became part of the spoils of war and, along with other smaller codexes, was taken away to Paris.

Original binding of the *Codex Atlanticus*
(16th century), in red leather,
with gilt decorations, 65 x 44 cm.
Milan, Biblioteca Ambrosiana.



DISEGNI DI MACCHINERIE

DELLE ARTI SEGRETE

ET ALTRE COSE

DI LEONARDO DA VINCI

RACCOLTI DA

POMPEO LEO

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Handwritten text in a historical script, possibly Arabic or Persian, located at the top left of the page.

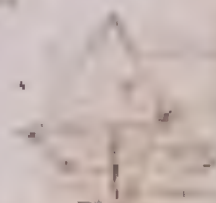


ture, grouped together in the *Codex Atlanticus*, from the naturalist, anatomical and figure studies, grouped together in the *Windsor Collection*. In effect, the papers by Leonardo found in the *Codex Atlanticus* deal with an incredible variety of subjects, including painting, sculpture, geometry, perspective, optics, astronomy, mathematics, engineering, architecture, urban planning, etc.

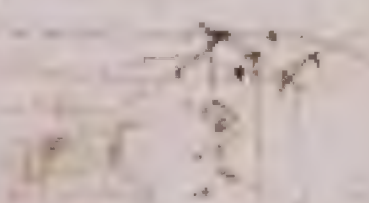
The drawings and notes appear on papers of extremely different size, starting from fragments and arriving at the great sheets on which Leonardo realized, with extreme accuracy and precision, some drawings illustrating his technological projects, in which he seems to have conceived real “portraits of machines”.

Sheet of studies on artificial flight:
on the upper right, *Sketch of a parachute*,
c. 1480;
Milan, CA f. 1058v [381v. a].

Handwritten text in a cursive script, likely a medieval manuscript. The text is arranged in several lines across the top of the page.



Handwritten text in a cursive script, likely a medieval manuscript. The text is arranged in several lines across the middle of the page.



Handwritten text in a cursive script, likely a medieval manuscript. The text is arranged in several lines across the bottom right of the page.



Handwritten text in a cursive script, likely a medieval manuscript. The text is arranged in several lines across the bottom left of the page.



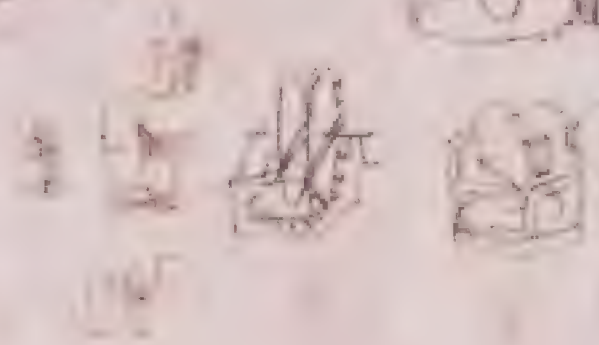
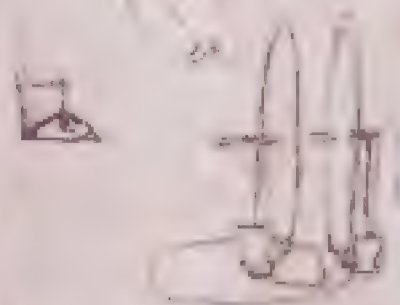
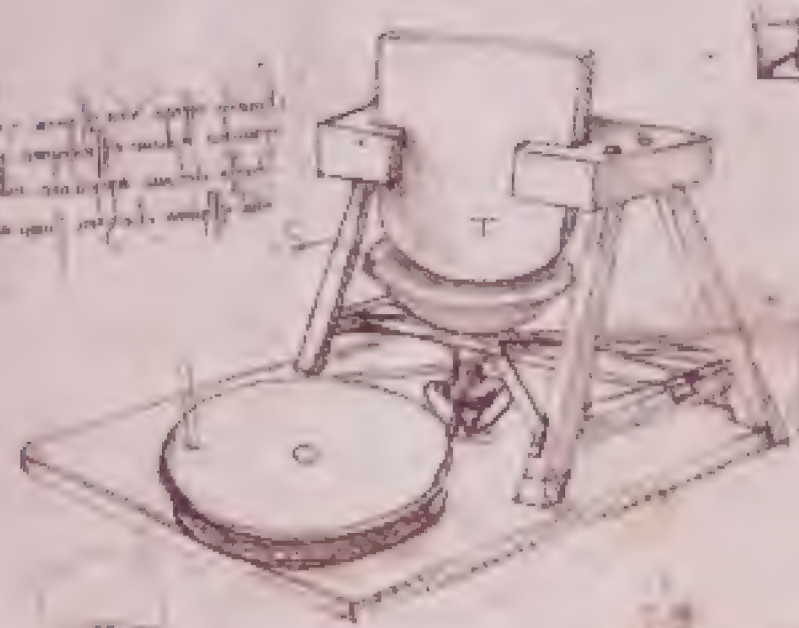
*Systems of locks
for river navigation,
c. 1480-1482;
Milan, CA f. 90v [33v. a].*

*Devices for fabricating
concave mirrors,
c. 1478-1480;
Milan, CA f. 17v [4v. a].*

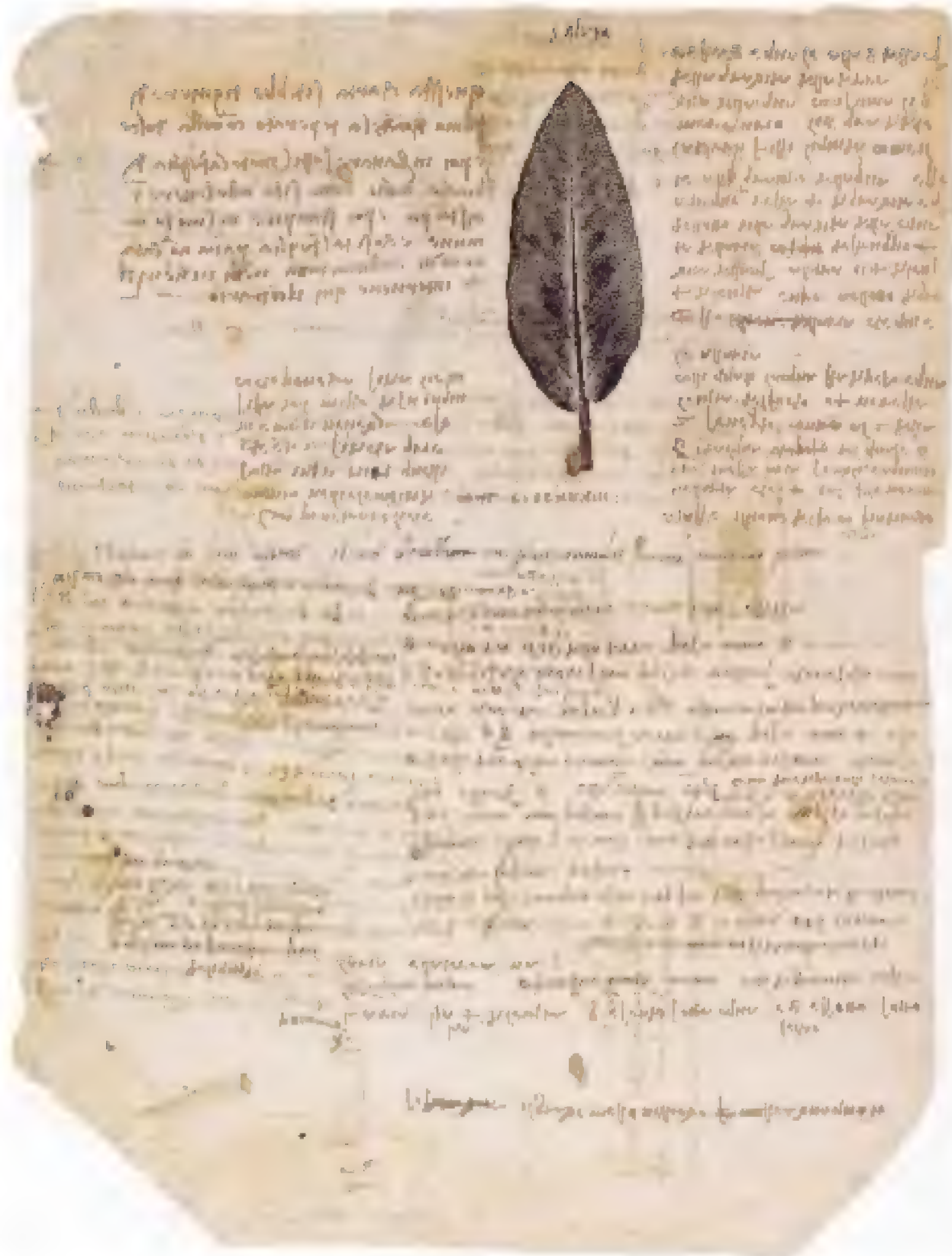
1. A machine for measuring the weight of a body, consisting of a balance scale, a spring, and a weight.



2. A machine for measuring the weight of a body, consisting of a balance scale, a spring, and a weight.



3. A machine for measuring the weight of a body, consisting of a balance scale, a spring, and a weight.



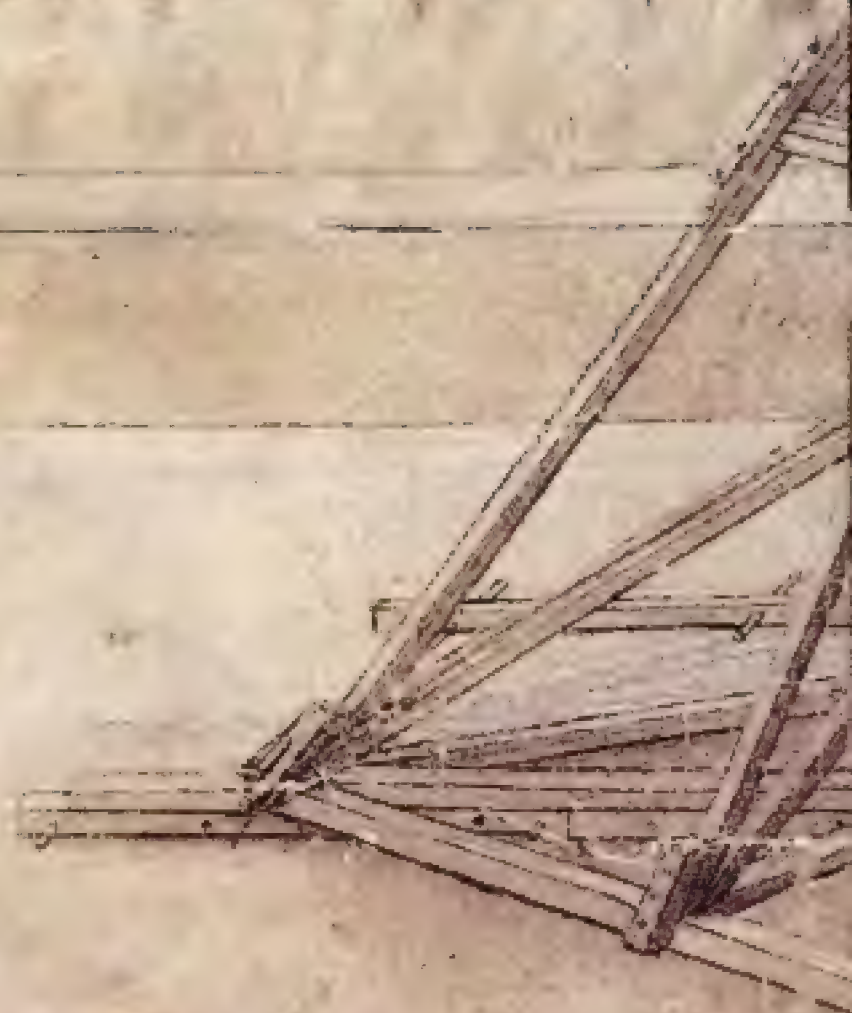
*System of physiological
printing (sage leaf),
1508-1510;
Milan, CA f. 197v [72v. a].*

*Machine gun,
1480-1482;
Milan, CA f. 157r
[56v. a].*

*On pp. 362-363:
Machine for excavating
a channel, c. 1503;
Milan, CA f. 4r [1v. b].*

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Handwritten text in the top left corner, likely bleed-through from the reverse side of the page. The text is faint and mostly illegible due to fading and the age of the paper.



Handwritten text at the bottom of the page, likely a signature or a note related to the drawing. The text is faint and mostly illegible.

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Handwritten text below the first row of diagrams, providing explanations or instructions for the constructions.



Handwritten text below the second row of diagrams, providing explanations or instructions for the constructions.



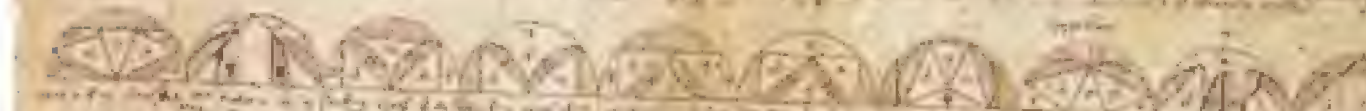
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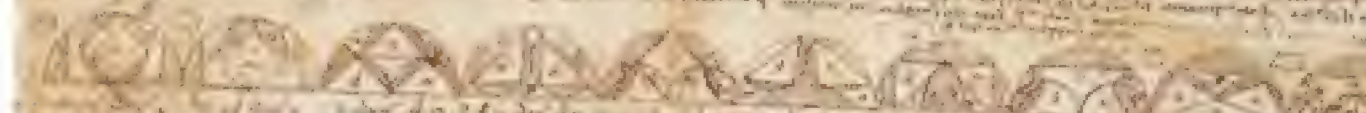
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Handwritten text below the fifth row of diagrams, providing explanations or instructions for the constructions.



Handwritten text below the sixth row of diagrams, providing explanations or instructions for the constructions.



Handwritten text below the seventh row of diagrams, providing explanations or instructions for the constructions.



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Handwritten text below the ninth row of diagrams, providing explanations or instructions for the constructions.





Handwritten text in a cursive script, likely a historical or scientific treatise, spanning the width of the page.

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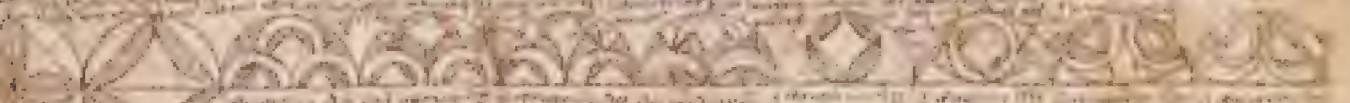
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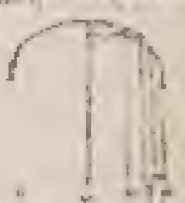
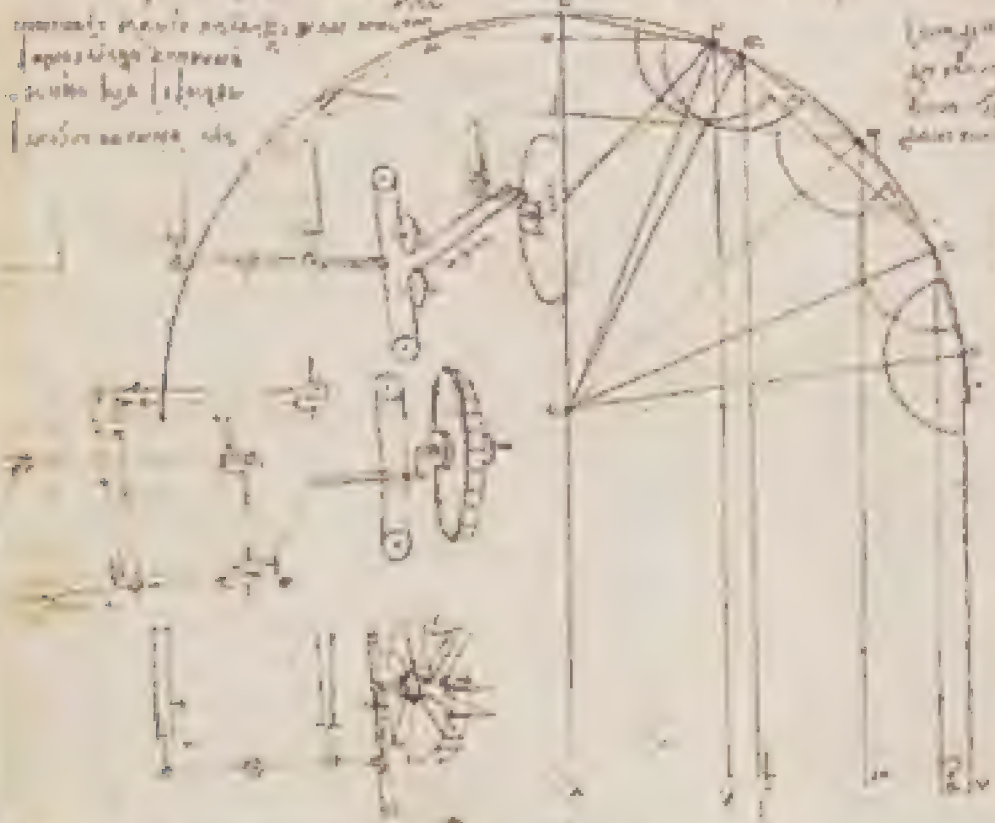


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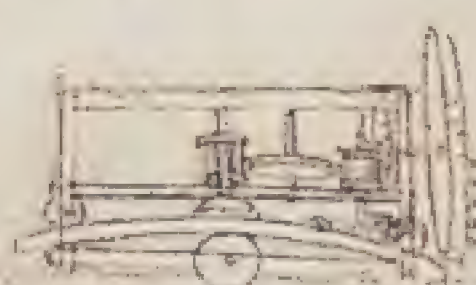
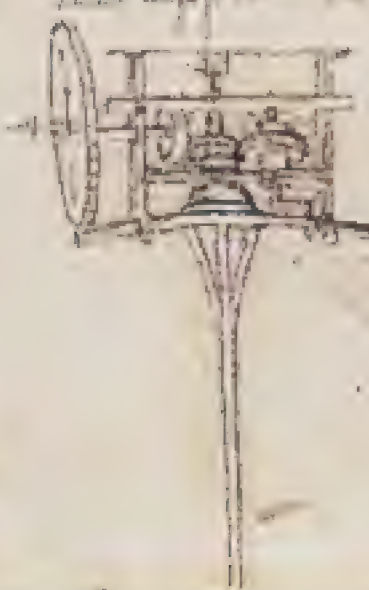
1. *Amphiprion* *permanens*
 2. *Amphiprion* *permanens*
 3. *Amphiprion* *permanens*
 4. *Amphiprion* *permanens*

[Faint handwritten notes at the bottom of the page]

1. The first part of the paper is a
 general introduction to the subject
 of the paper. It is a very
 interesting paper and I have
 read it with great interest.



[Faint handwritten notes]



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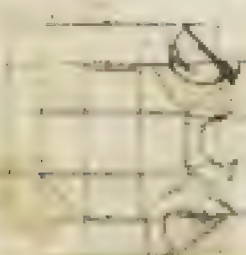
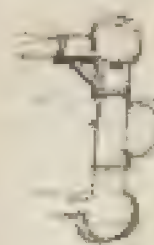
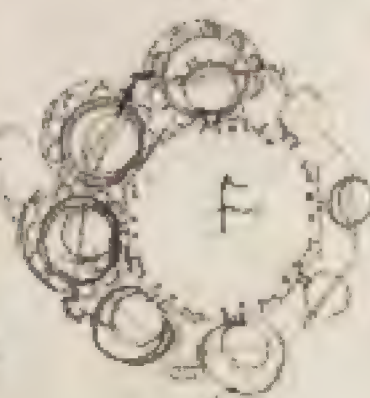
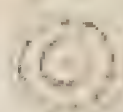
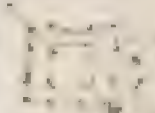
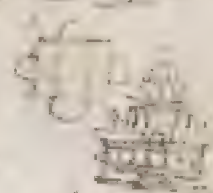
*Geometric proportions
applied to the study
of traction: the force exerted
by the oxen is proportionally
inverse to the diameter
of the wheel to be pulled,
c. 1487-1490; Milan
CA f. 561r [211r. a].*

On p. 372:
*Studies of architecture
for the Cathedral of Pavia,
c. 1487-1490;
Milan, CA f. 362v-b.*

On p. 373:
*Studies on solid geometry
with a memorandum
(center, above):
"Make glasses
to see the moon large",
c. 1513-1514; Milan,
CA f. 518r [190r. a].*



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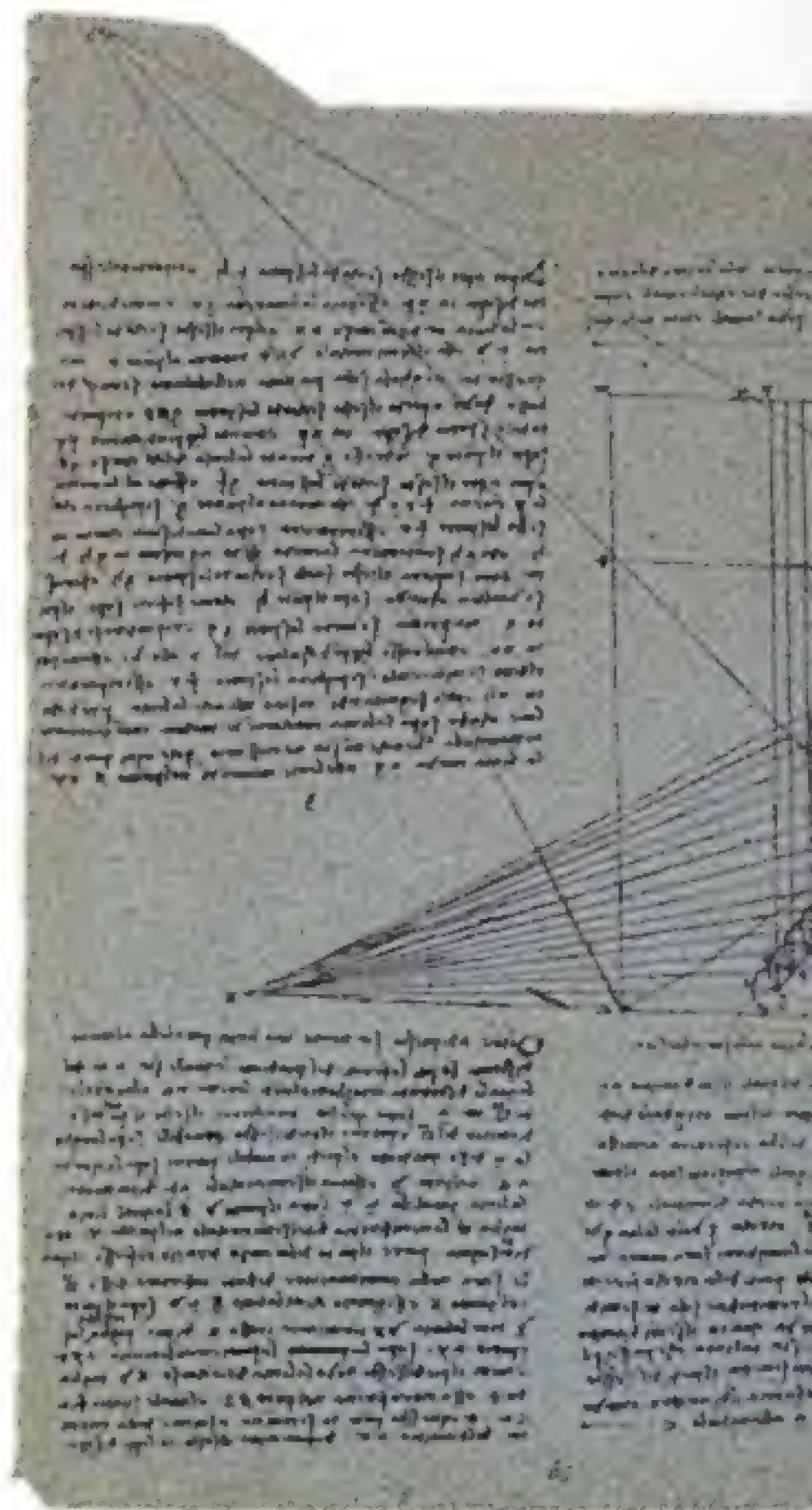
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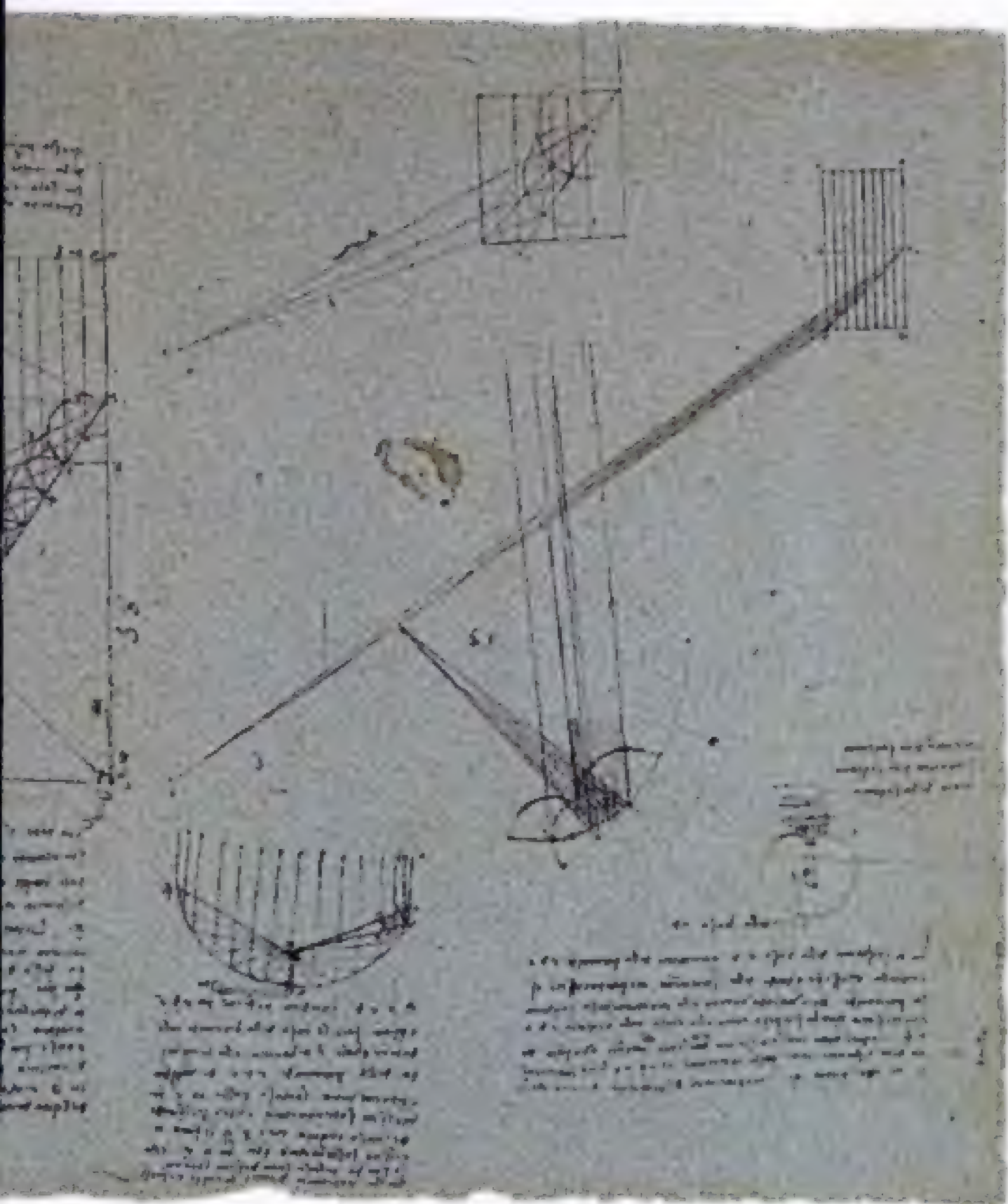
*Study of parabolic
mirrors with large
radius for exploiting
solar energy,*
c. 1513-1515;
Milan, CA f. 750r
[277r. a].

On p. 378:
Revolving crane,
c. 1478-1480;
Milan, CA f. 965r
[349r. a].

On p. 379:
*First ideas
for the lantern on the
Duomo of Milan,*
c. 1490;
Milan, CA f. 719r
[266r. a-b].

On pp. 380-381:
*Studies for
underwater boat,*
c. 1485-1487;
Milan, CA f. 881r
[320v. b].





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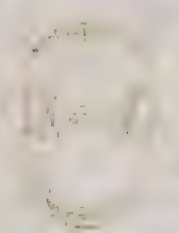
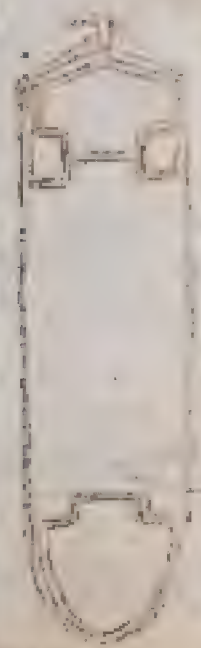
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55





*System of defense
and studies of horses
for the 'Battle of Anghiari',
c. 1504; Milan
CA f. 72r [24r. a-24v. c].*



*Machine with
reciprocating
motion: exploded
view of the
complicated
mechanism,
c. 1478-1480;
Milan, CA f. 30v
[8v. b].*

On pp. 386-387:
*Bombards or mortars
with mechanisms
for adjusting
the range: the
cannonballs,
upon falling to
the ground, emitted
smaller shells,
c. 1485; Milan,
CA f. 33r [9v .a].*





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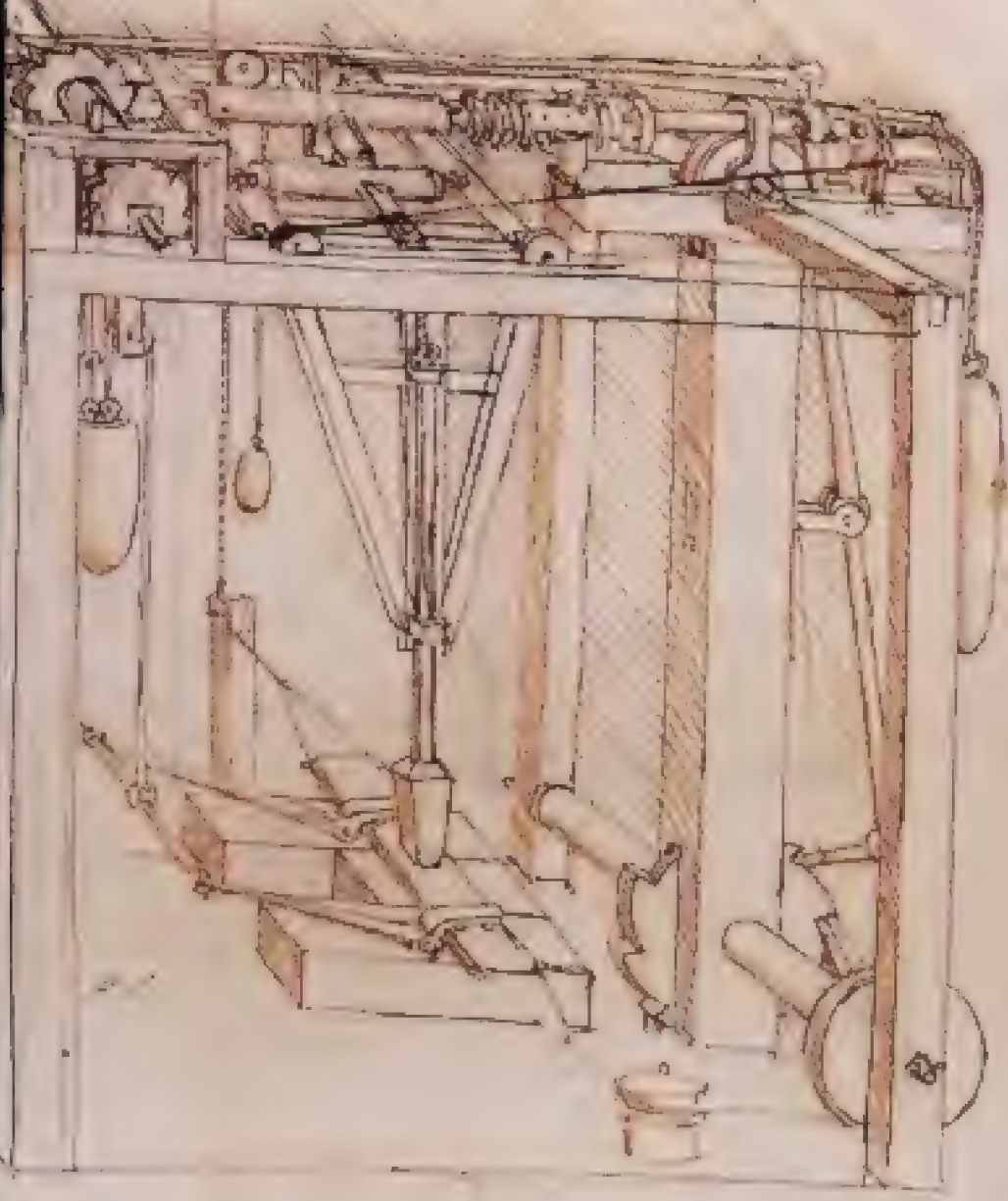


Hydraulic studies;
 above, *devices*
for breathing
underwater,
 and on the left,
floaters for
walking on water,
 1480-1482;
 Milan, CA f. 26r [7r. a].



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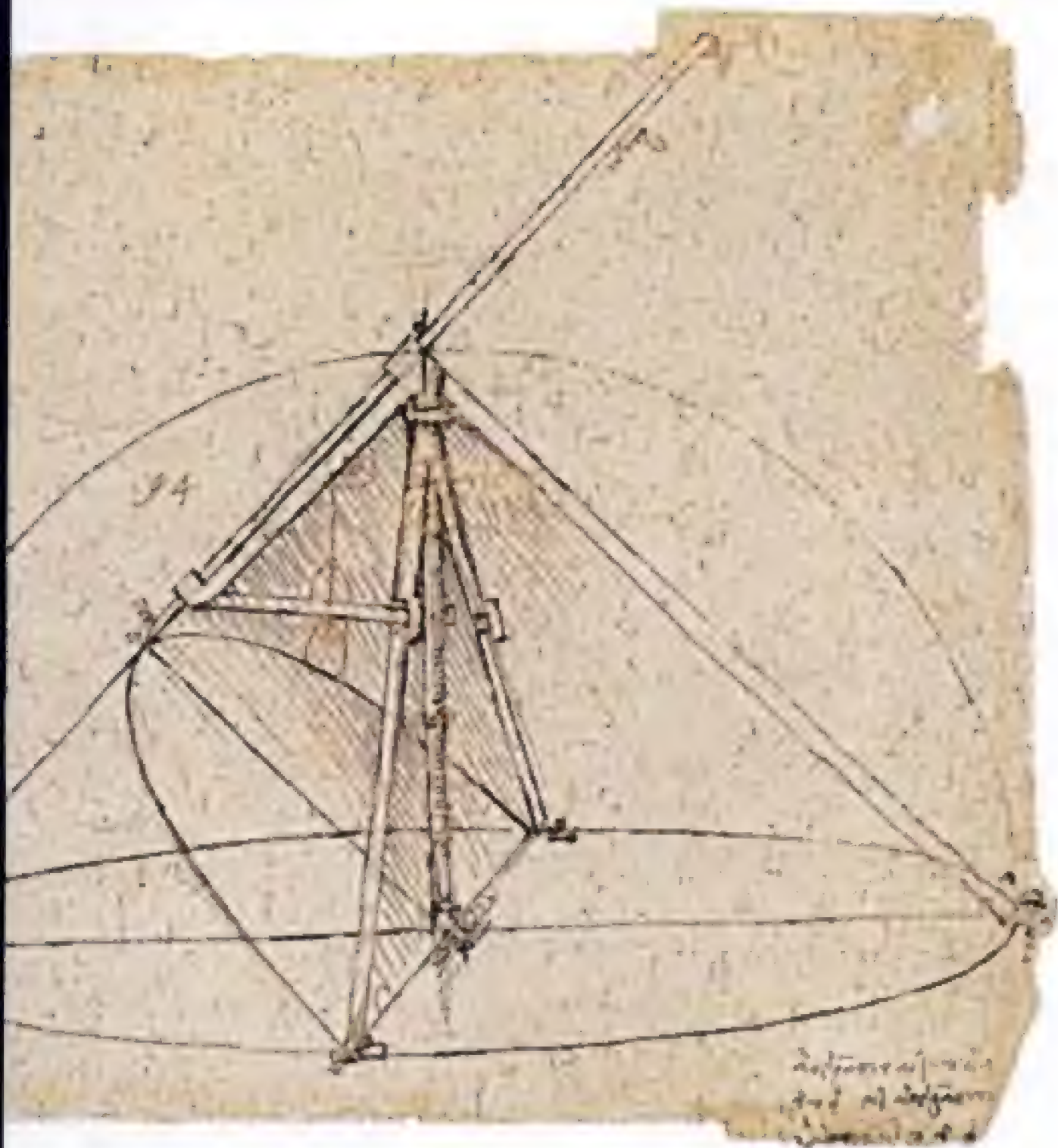
Handwritten text in a historical script, likely Arabic or Persian, located at the top of the page. The text is written in a cursive style and appears to be a description or commentary related to the mechanical drawing below.





Parabolic compass,
1513-1514;
Milan, CA f. 1093r [394r. a].

On pp. 394-395:
Project for digging canals
of traditional type,
c. 1503; Milan, CA f. 3r [1v. a].



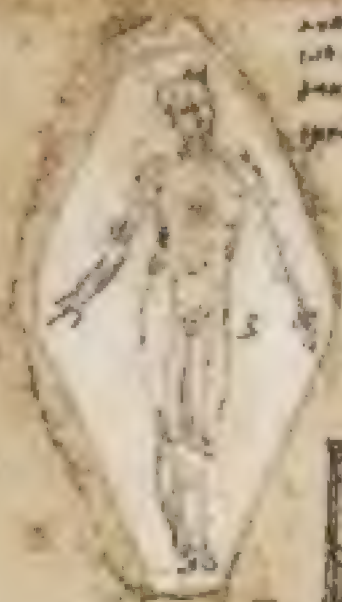




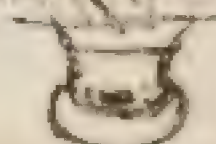
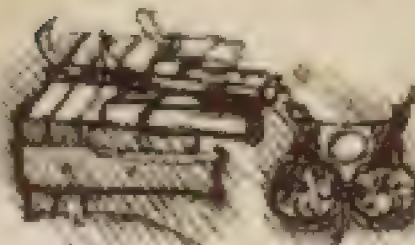
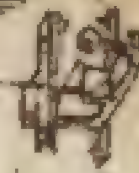
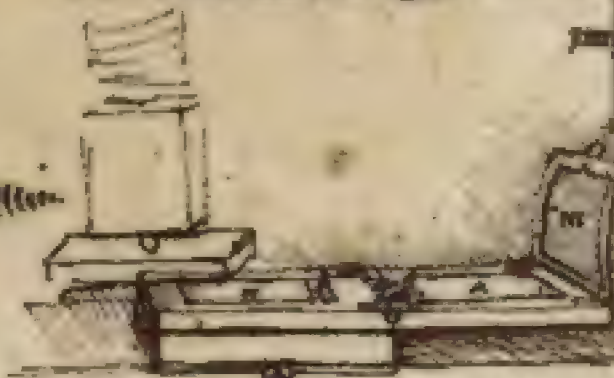
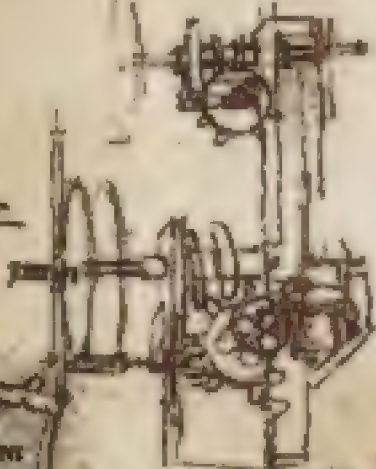
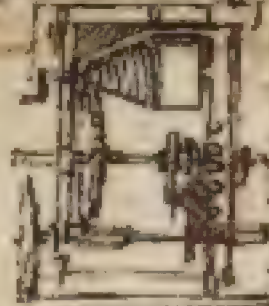
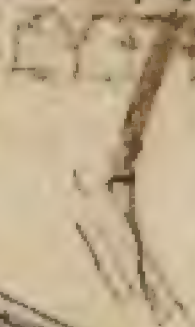
*Mechanical studies
 with details
 of automatic page
 inserter for printing
 press on a folio
 reconstructed using
 two folios from the
 'Codex Atlanticus',
 c. 1497;
 Milan, CA
 f. 1038r [372r, b];
 and a fragment
 from Windsor
 (standing figure),
 c. 1497;
 Windsor, RL 1272.*



3. 4. 5.
 2. 4. 12. 1/2.
 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.



1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.



WINDSOR COLLECTION

Windsor Castle,
Royal Library

The collection consists of nearly six hundred drawings that Pompeo Leoni had mounted on 234 sheets measuring about 48 x 35 cm. The volume, bound in red leather, bore the title in gilt characters: "DRAWINGS OF LEONARDO DA VINCI RESTORED BY POMPEO LEONI" but the "restoration" had actually been quite destructive in nature. In fact, the drawings now in Windsor Castle even contain some fragments of very reduced size, often small figures, that Leoni had cut out of large folios of studies which, based on the redistribution of the subjects effected by him, now form a large part of the *Codex Atlanticus*. In a modern typology of restoration, begun in the late 19th century and completed in 1994, the volume has been separated into loose folios, each placed between two sheets of perspex. The folios have then been divided into five thematic sections: anatomy; landscapes, plants and water studies; horses and other animals; figure studies; and miscellaneous papers.

Original binding of the *Windsor Collection*,
in red leather, with gilt decorations, 16th century;
Windsor Castle, Royal Library.

DISEGNI DI LEONARDO

DA VINCI RESTAV

RATI

DA POMPEO

LEONI

ANATOMY

The most conspicuous part of the *Windsor Collection* is composed of about two hundred folios documenting Leonardo's research in the field of anatomy. The studies on the human body, which he conducted through the practice of dissection, cover a span of time of some thirty years, from 1485 to 1515. His investigation of the machine of the body began with his studies of the cranium, in which he attempted to locate the site of the soul. These drawings document the progress made by Leonardo in the acquisition of anatomical knowledge and, contemporaneously, the gradual perfecting of a graphic language that allowed him to record his observations precisely. Leonardo was fully aware of the force of the images he created and of the possibility of concentrating in a single drawing a vast amount of information, such as no description in words could ever do: "With how many words could you describe this heart, except by filling a book..."

*Anatomical figure depicting the heart,
lungs and major arteries,
c. 1493;
Windsor, RL 12597r.*

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*Old man with thin body,
probably the centenarian
dissected by Leonardo in 1507,
c. 1507-1508;
Windsor, RL 19007r.*

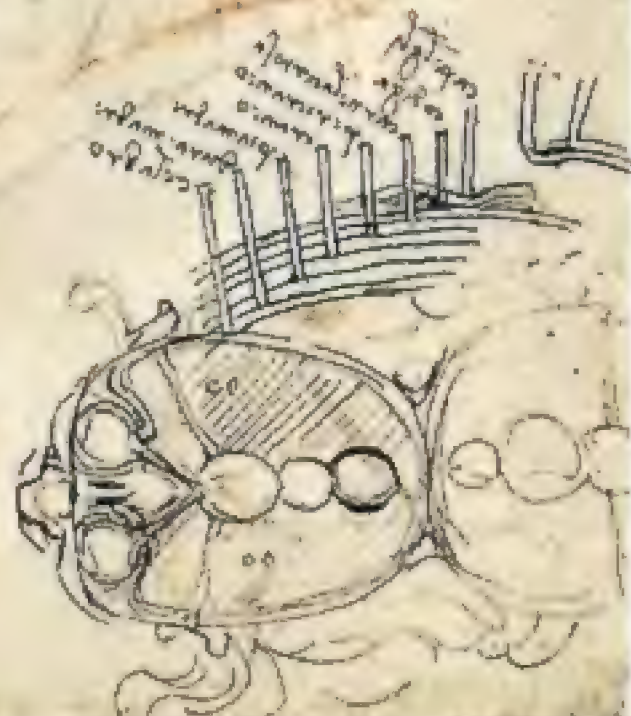
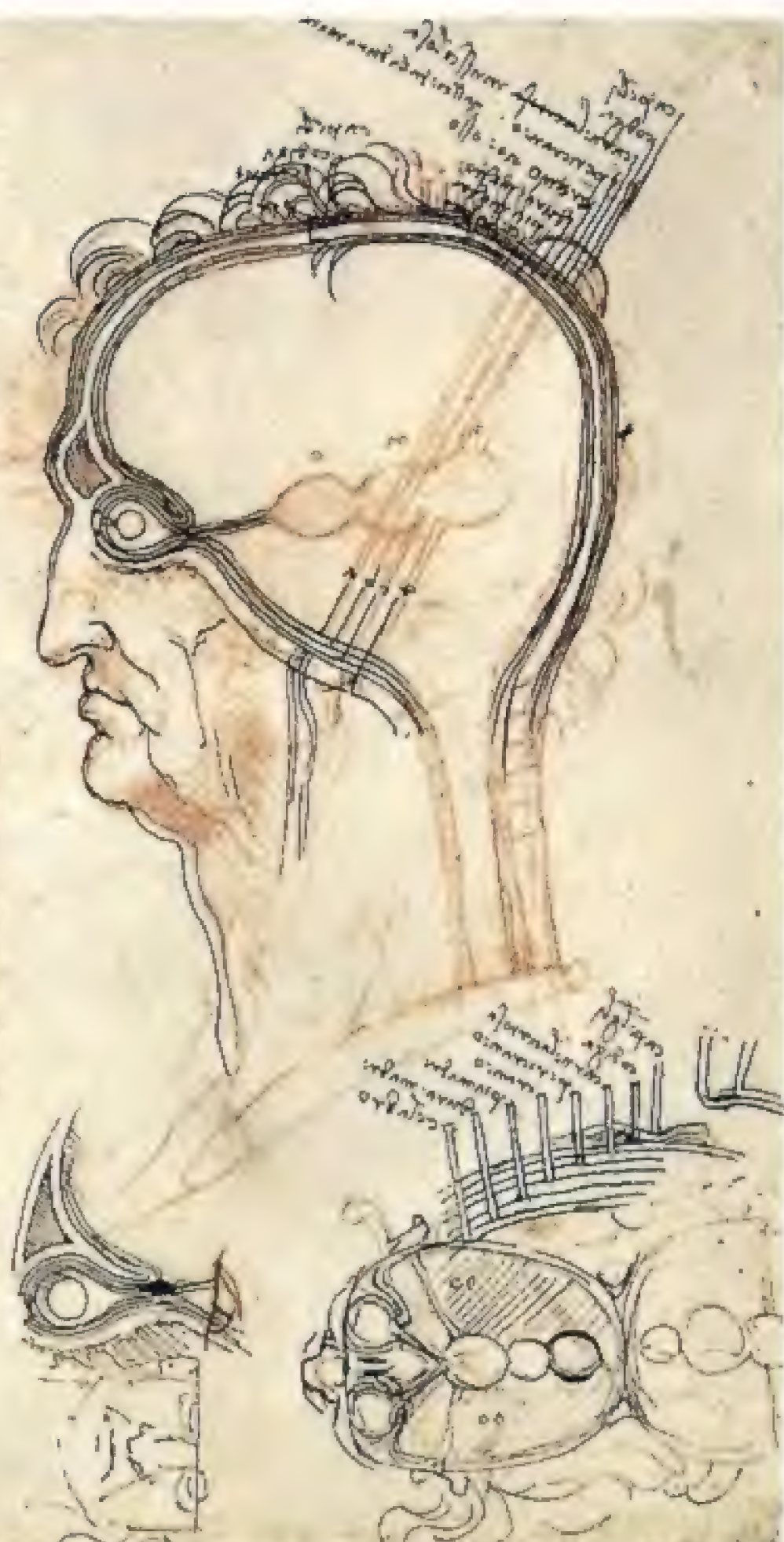
*Muscles of the neck, shoulder
and chest in action,
c. 1508-1510;
Windsor, RL 19001v.*

On p. 404:
*Cross-section of a human head,
c. 1493-1494;
Windsor, RL 12603r.*

On p. 405:
*Side view of the cranium,
c. 1489;
Windsor, RL 19057r.*



Handwritten text in a cursive script, likely a medical or anatomical treatise, located on the left side of the page. The text is arranged in several paragraphs, with some lines indented. The script is dark and appears to be from a historical manuscript.



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*Bones of the foot
and of the shoulder.*
1508-1510;
Windsor, RL 19011r.

On p. 408:
Muscles of the shoulder,
1509-1510;
Windsor, RL 19003v.

On p. 409:
*Muscles of the shoulder
at three stages of dissection;
bones of the foot,*
c. 1508-1510;
Windsor, RL 19013v.

On p. 410:
*Male genital organs, bladder,
urinary and seminal canal;
above: pig's lung,*
1508-1509;
Windsor, RL 19098v.

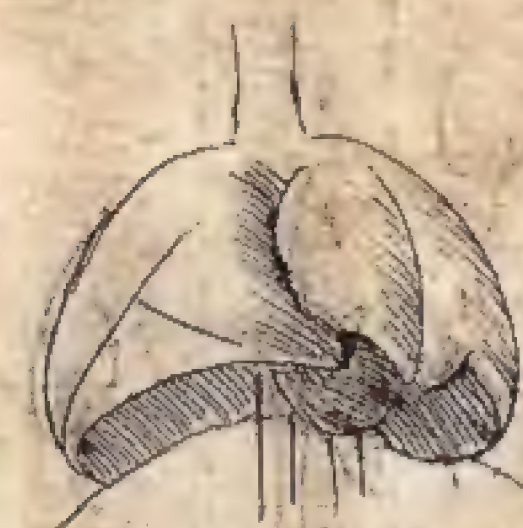
On p. 411:
*Muscles of the arm in rotation,
tongue, throat and uvula,*
c. 1508-1510;
Windsor, RL 19005v.

[illegible]

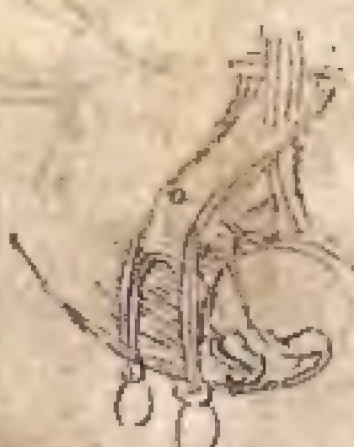
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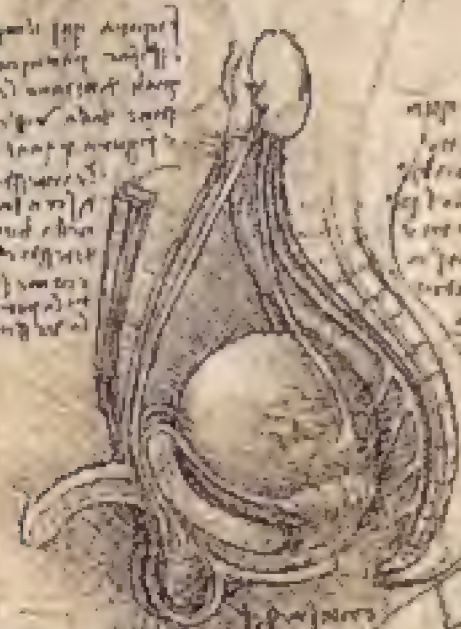


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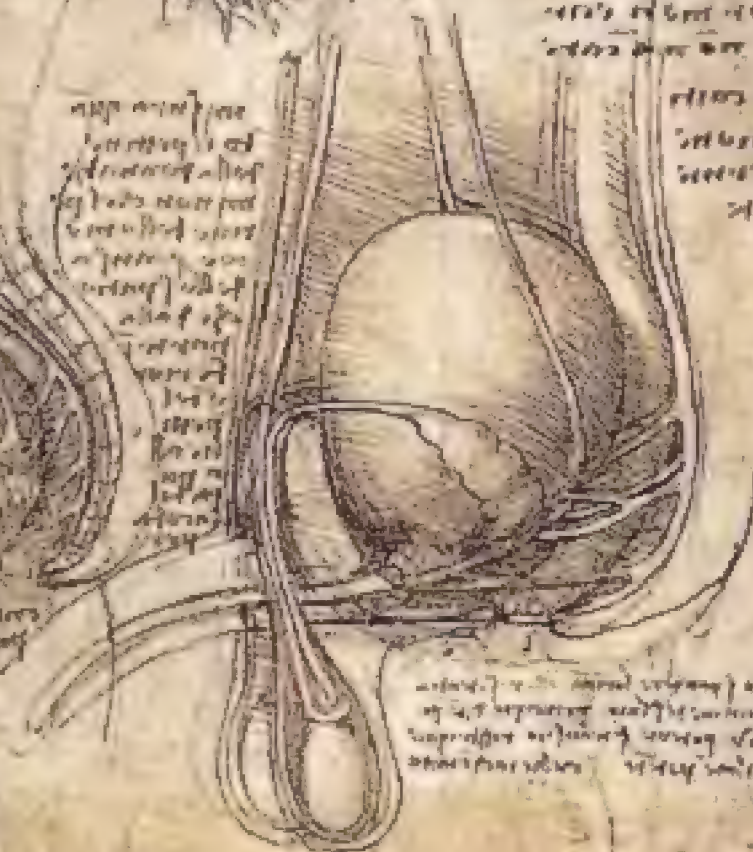
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Handwritten text in a cursive script, likely Latin, describing the anatomical structure shown in the drawing below.



Handwritten text in a cursive script, likely Latin, describing the anatomical structure shown in the drawing above.

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Handwritten text in a cursive script, likely Latin, describing the anatomical structure shown in the drawing above.

Handwritten text in a cursive script, likely Latin, describing the anatomical structure shown in the drawing above.

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1. *Spina dorsalis* est pars
 superior columnae vertebrae
 et continet vertebrae
 quatuordecim.

2. *Spina thoracica* est
 pars media columnae
 et continet vertebrae
 duodecim.

3. *Spina lumbalis* est
 pars inferior columnae
 et continet vertebrae
 quinque.

- 1. Cervicis
- 2. Cervicis
- 3. Cervicis
- 4. Cervicis
- 5. Cervicis
- 6. Cervicis
- 7. Cervicis
- 8. Cervicis
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- 11. Cervicis
- 12. Cervicis
- 13. Cervicis
- 14. Cervicis
- 15. Cervicis
- 16. Cervicis
- 17. Cervicis
- 18. Cervicis
- 19. Cervicis
- 20. Cervicis

4. *Spina sacralis* est
 pars inferior columnae
 et continet vertebrae
 quinque.



1. *Spina dorsalis* est pars
 superior columnae vertebrae
 et continet vertebrae
 quatuordecim.

2. *Spina thoracica* est
 pars media columnae
 et continet vertebrae
 duodecim.

3. *Spina lumbalis* est
 pars inferior columnae
 et continet vertebrae
 quinque.

4. *Spina sacralis* est
 pars inferior columnae
 et continet vertebrae
 quinque.

5. *Spina coccygea* est
 pars inferior columnae
 et continet vertebrae
 tres.



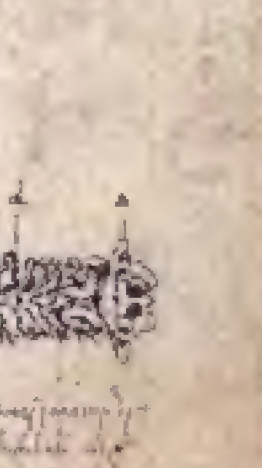
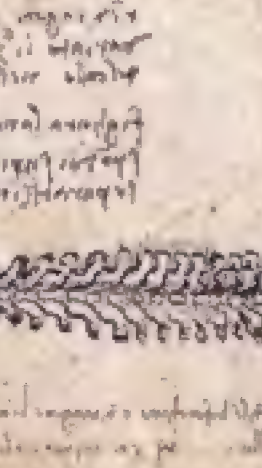
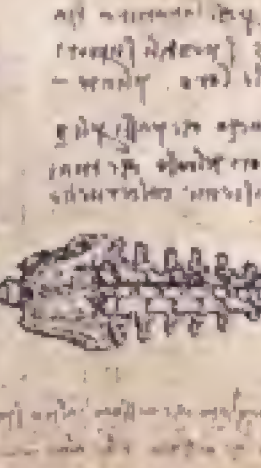
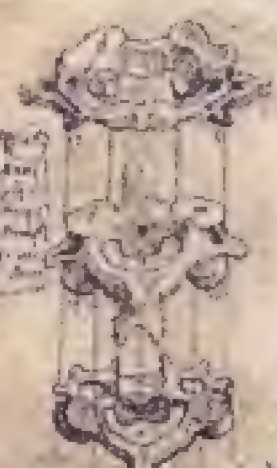
1. *Spina dorsalis* est pars
 superior columnae vertebrae
 et continet vertebrae
 quatuordecim.

2. *Spina thoracica* est
 pars media columnae
 et continet vertebrae
 duodecim.

3. *Spina lumbalis* est
 pars inferior columnae
 et continet vertebrae
 quinque.

4. *Spina sacralis* est
 pars inferior columnae
 et continet vertebrae
 quinque.

5. *Spina coccygea* est
 pars inferior columnae
 et continet vertebrae
 tres.



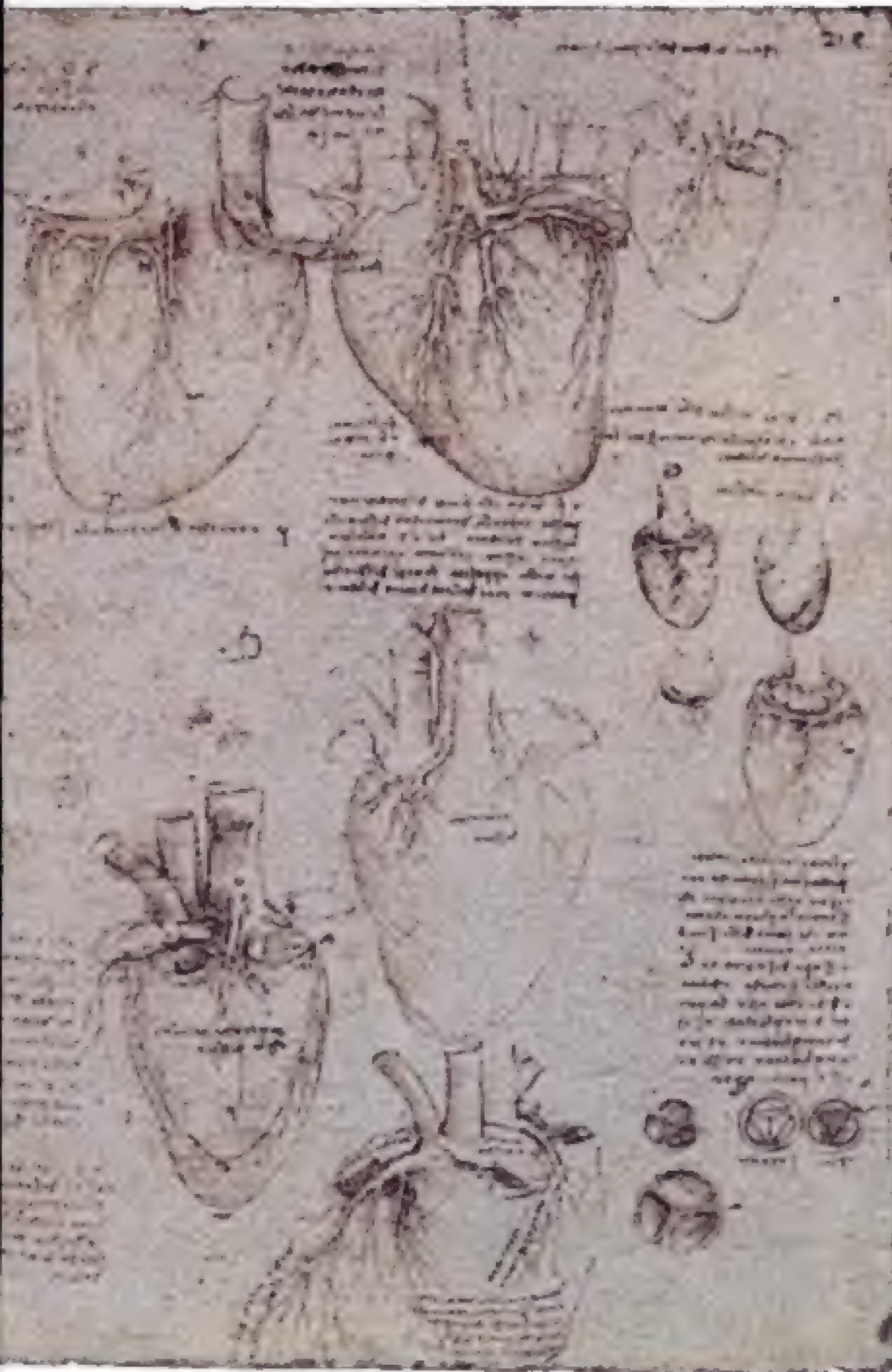
1. *Spina dorsalis* est pars
 superior columnae vertebrae
 et continet vertebrae
 quatuordecim.

2. *Spina thoracica* est
 pars media columnae
 et continet vertebrae
 duodecim.

3. *Spina lumbalis* est
 pars inferior columnae
 et continet vertebrae
 quinque.

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Handwritten text in the top left corner, likely a title or introductory note.

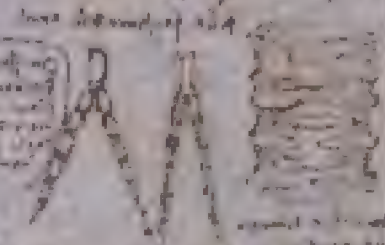
Handwritten text in the top center, possibly a subtitle or descriptive label.

Handwritten text in the top right corner, continuing the descriptive or introductory notes.

Column of handwritten text on the left side of the page, providing detailed descriptions or commentary.



Column of handwritten text on the right side of the page, continuing the detailed descriptions or commentary.



Bottom left section of handwritten text, likely concluding the main body of the work or providing additional notes.

Bottom center section of handwritten text, continuing the detailed descriptions or commentary.

Bottom right section of handwritten text, likely concluding the main body of the work or providing additional notes.

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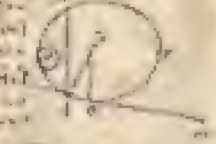
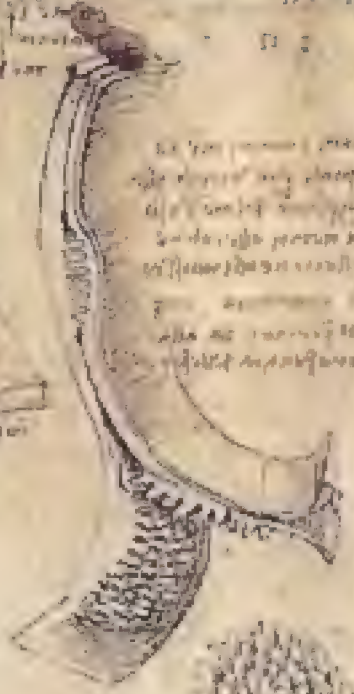
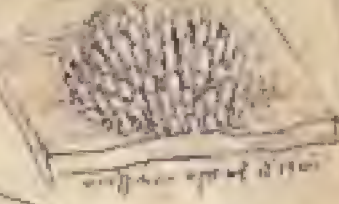
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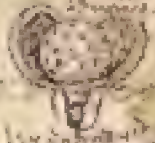
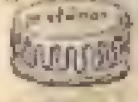
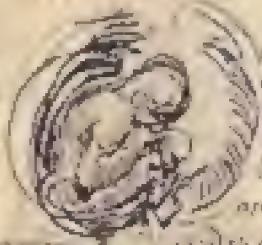
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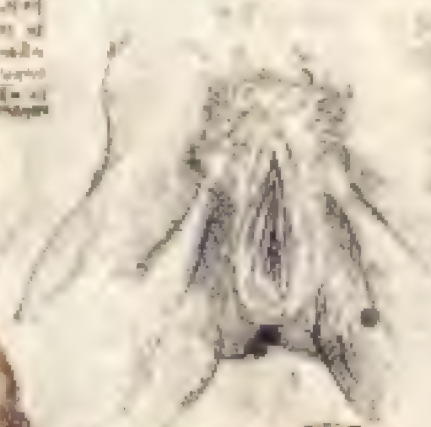
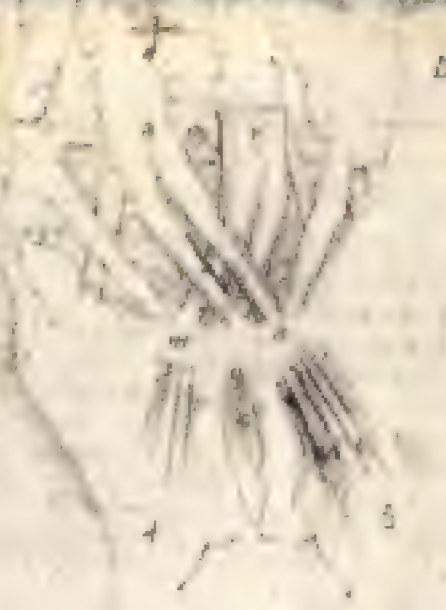
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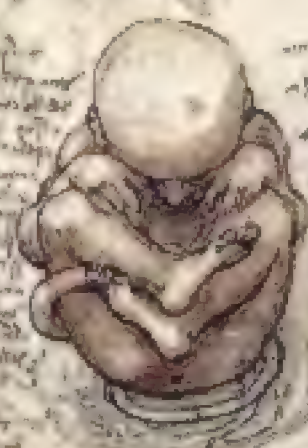
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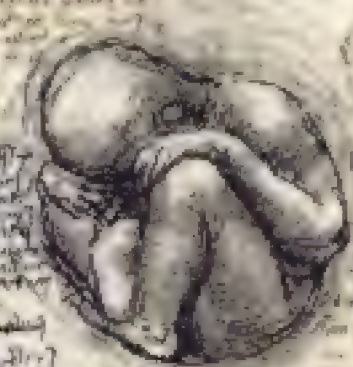
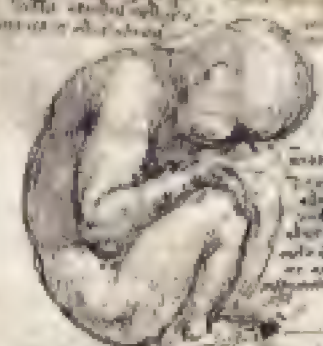


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Handwritten text in a historical script, likely Latin or Greek, located in the lower center of the manuscript page.

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LANDSCAPES, PLANTS AND WATER STUDIES

The nearly 70 drawings that make up this section show a number of themes: youthful studies, “narrated landscapes” (which refer to literary texts), studies of mountains, studies of plants for the *Leda*, drawings executed in red pencil on red prepared paper, studies of water, views of the river Adda, symbolic landscapes and the *Deluges*. The drawing with the *Profile of an old man and studies of whirlpools* seems to portray Leonardo himself, now elderly, seated in contemplation of the analogy between the surfaces of flowing water and tousled hair; an annotation records, “Note the motion of the surface of water, which resembles hair...” The surprising series of *Deluges* consists of 16 drawings devoted to the theme of the upheaval of the elements brought about by the forces of nature. Here the representation of the infinite movement of transformation of the earth is not so much the visual recording of a real phenomenon as the mental elaboration of it as a symbolic image.

Study of plants,
c. 1506;
Windsor, RL 12424.





*Study of two plants for the 'Leda':
Caltha palustris (left)
and Anemone nemorosa (right),
1508-1510;
Windsor, RL 12423r.*

*Beech woods,
c. 1508;
Windsor, RL 12431r.*

*On p. 432:
Rushes in flower,
c. 1506;
Windsor, RL 12430r.*

*On p. 433:
Study of a tree,
probably a fig,
c. 1506;
Windsor, RL 12417r.*







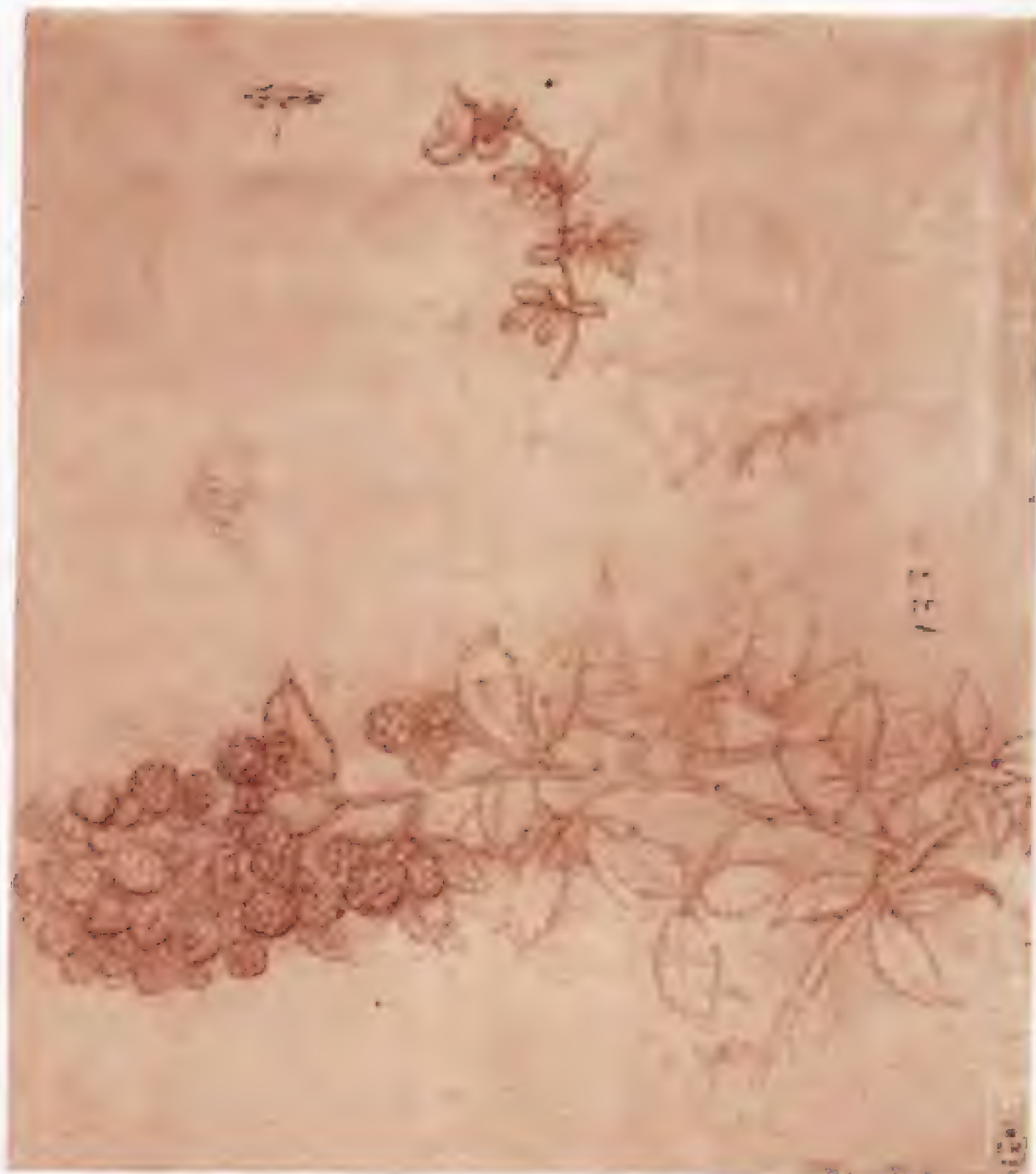


*Branch of an oak tree
and detail of dyers' grass, c. 1508;
Windsor, RL 12422r.*



*Study of reeds,
c. 1508;
Windsor, RL 12428r.*

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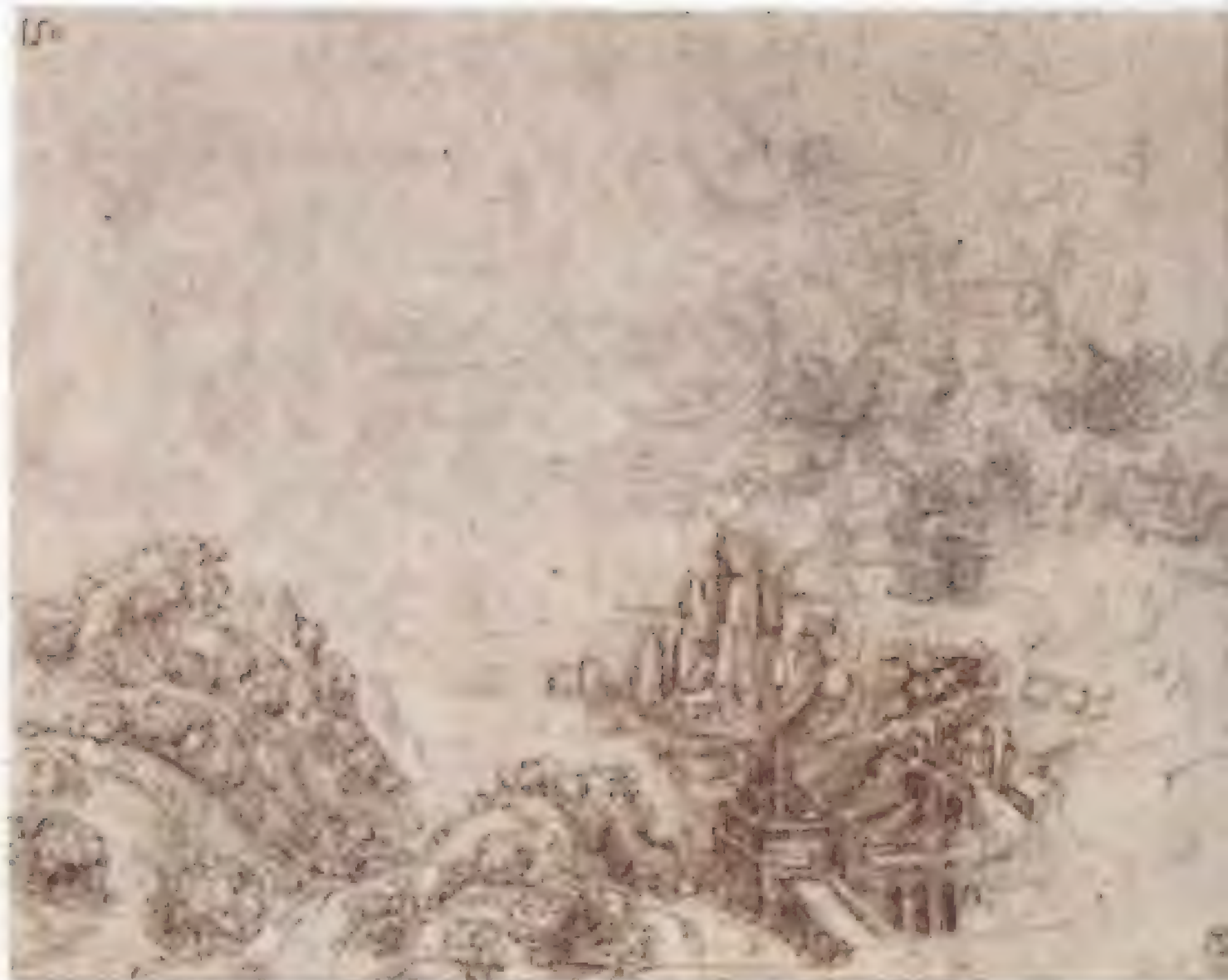


Study of a mulberry branch,
c. 1506;
Windsor, RL 12420r.

Detail of two types of reed,
c. 1508;
Windsor, RL 12421r.

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*Hurricane of wind and rain
over a bay with a castle and viaduct.*

c. 1510;

Windsor, RL 12401r.

*City on the plain surrounded
by mountain chains,*

c. 1510;

Windsor, RL 12407r.

Rolling hills and rocky peaks,

c. 1510;

Windsor, RL 12405r.

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*Old man seated in profile
with studies of whirlpools,
c. 1513;
Windsor, RL 12579r.*

57

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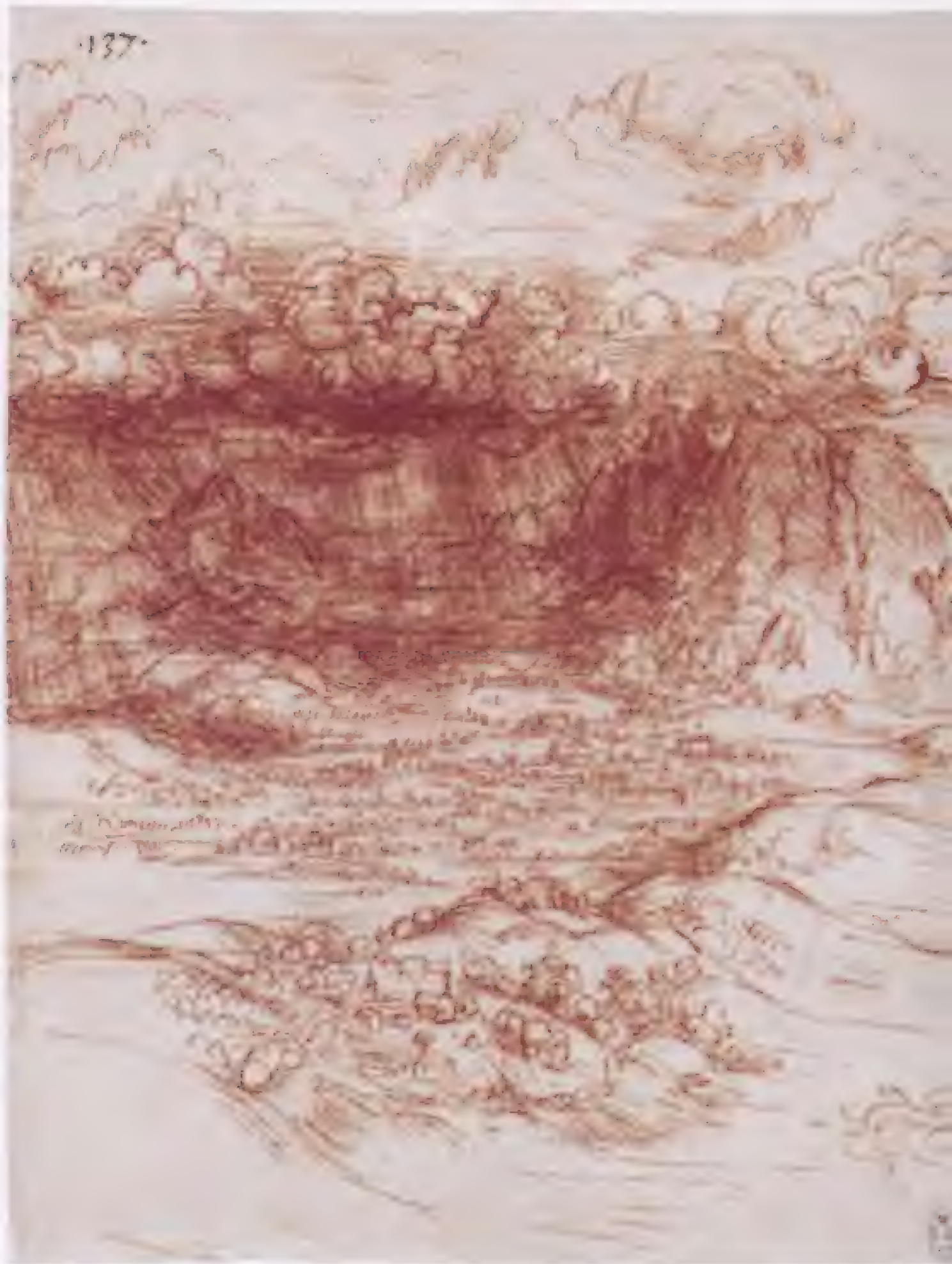
Study of a deluge,
c. 1515;
Windsor, RL 12380.

On p. 448:
*Storm over a
mountain valley,*
c. 1500;
Windsor, RL 12409.

On p. 449:
Volcanic explosion,
c. 1517-1518;
Windsor, RL 12388.







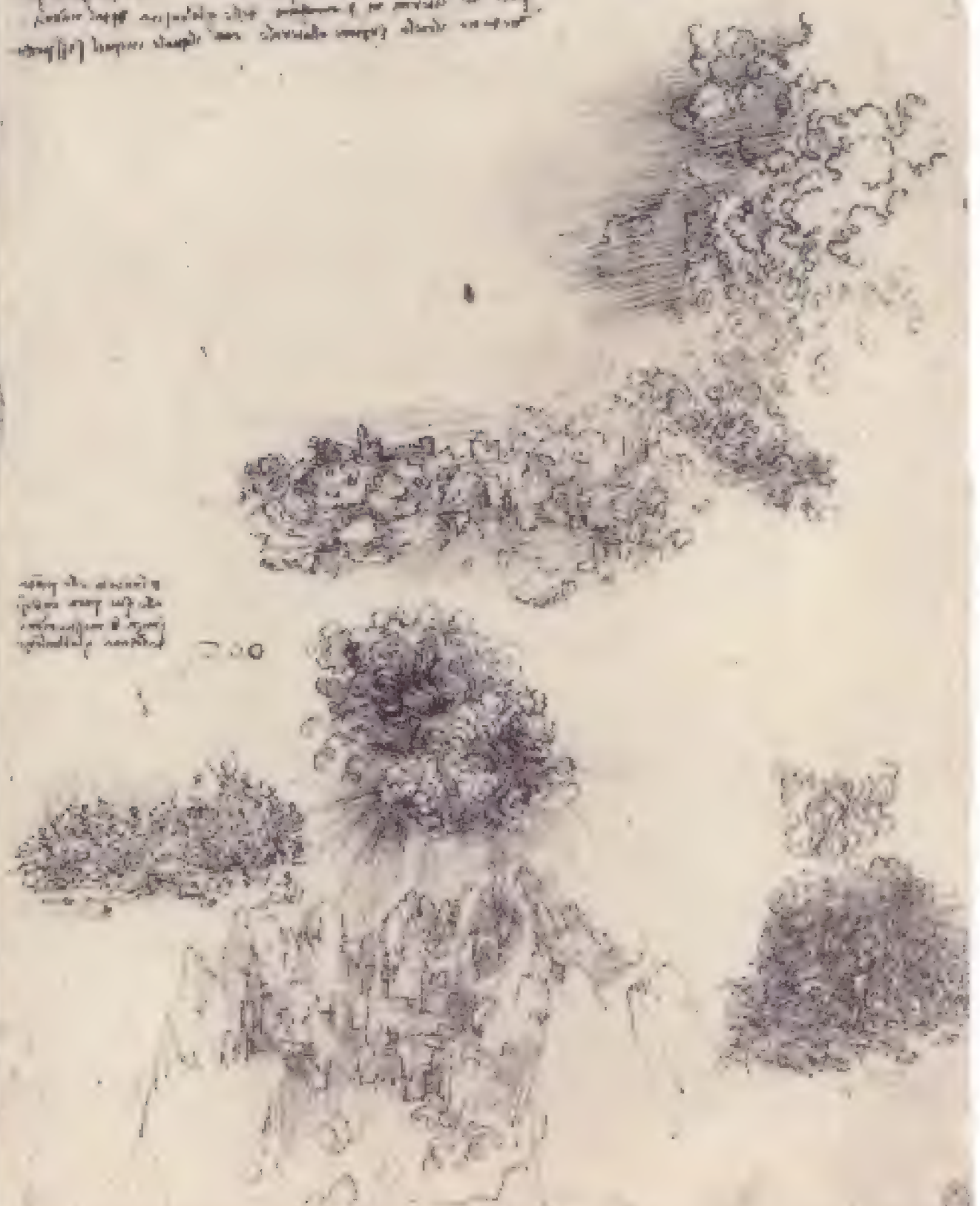
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Handwritten text in the upper left section, possibly a list or descriptive notes.

Small handwritten note or label on the right side.

Handwritten text in the lower left section, possibly a list or descriptive notes.

Small handwritten note or label in the center.



HORSES AND OTHER ANIMALS

This section contains about 70 drawings. Among the first studies of animals are those drawn for scenes in the *Adoration of the Magi*: horses and riders as they appear in the background of the painting in the Uffizi, as well as the ox and the ass. The studies on the proportions of the horse were done in Milan directly from the horses in the stables near Castello Sforzesco, and were elaborated in view of the monument to Francesco Sforza, of which Leonardo realized only the colossal model of the horse in clay. Some versions show a group for an equestrian monument and refer to the one planned for Gian Giacomo Trivulzio, on which Leonardo worked during his second stay in Milan: still another project never brought to completion. On a folio of studies for the *Battle of Anghiari* appears the figure of the *Announcing Angel*, bearing within it the suggestion for the *Saint John the Baptist* in the Louvre.

Study of a rearing horse,
c. 1504;
Windsor RL 12336r.



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*Study of a horse
with diagram of proportions,
1478-1480;
Windsor, RL 12318.*

*Study of rearing horse and rider
trampling a fallen enemy,
c. 1490;
Windsor, RL 12358r.*





*Two studies
of grotesque animals,
c. 1510;
Windsor RL 12367r.*

fo.



*Study of
a fantastic animal,
probably idea
for an automaton,
1515-1516;
Windsor,
RL 12369.*



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FIGURE STUDIES

The fourth section consists of about 100 drawings, and the fifth is made up of miscellaneous papers. Among the studies of figures we find the preparatory drawings for the *Virgin of the Rocks* and others for the head of the *Leda*. Among his first known drawings, the *Study of hands* reflects an echo of Leonardo's apprenticeship in Verrocchio's workshop and probably documents the missing lower part of the *Portrait of Ginevra Benci*. In the caricatures Leonardo studies physiognomic and pathognomic traits.

MISCELLANEOUS PAPERS

The variety of themes dealt with ranges from riddles, emblems and allegories, to geographical charts, which form a group of about 20 folios. There are notes of scientific nature referring mainly to hydraulic engineering, architecture and technology. The *Neptune with sea horses* constitutes the trace of a large drawing conceived as a work in itself, now lost. The impetus of the horses calls to mind the grandiose dynamism that was to animate the unfinished *Battle of Anghiari*.

Study for the 'Leda' hairstyle,
1506-1508;
Windsor, RL 12516.





*Studies of woman's head
for the 'Leda',
c. 1506-1508;
Windsor, RL 12518.*

*Studies of woman's head
for the 'Saint Anne' in the Louvre,
c. 1510;
Windsor, RL 12518.*





Study of hands, c. 1581;
Windsor, RL 12615.

Study of hands, 1475-1478;
Windsor, RL 12558.

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38.

Map of Imola,
1502;
Windsor, RL 12284.

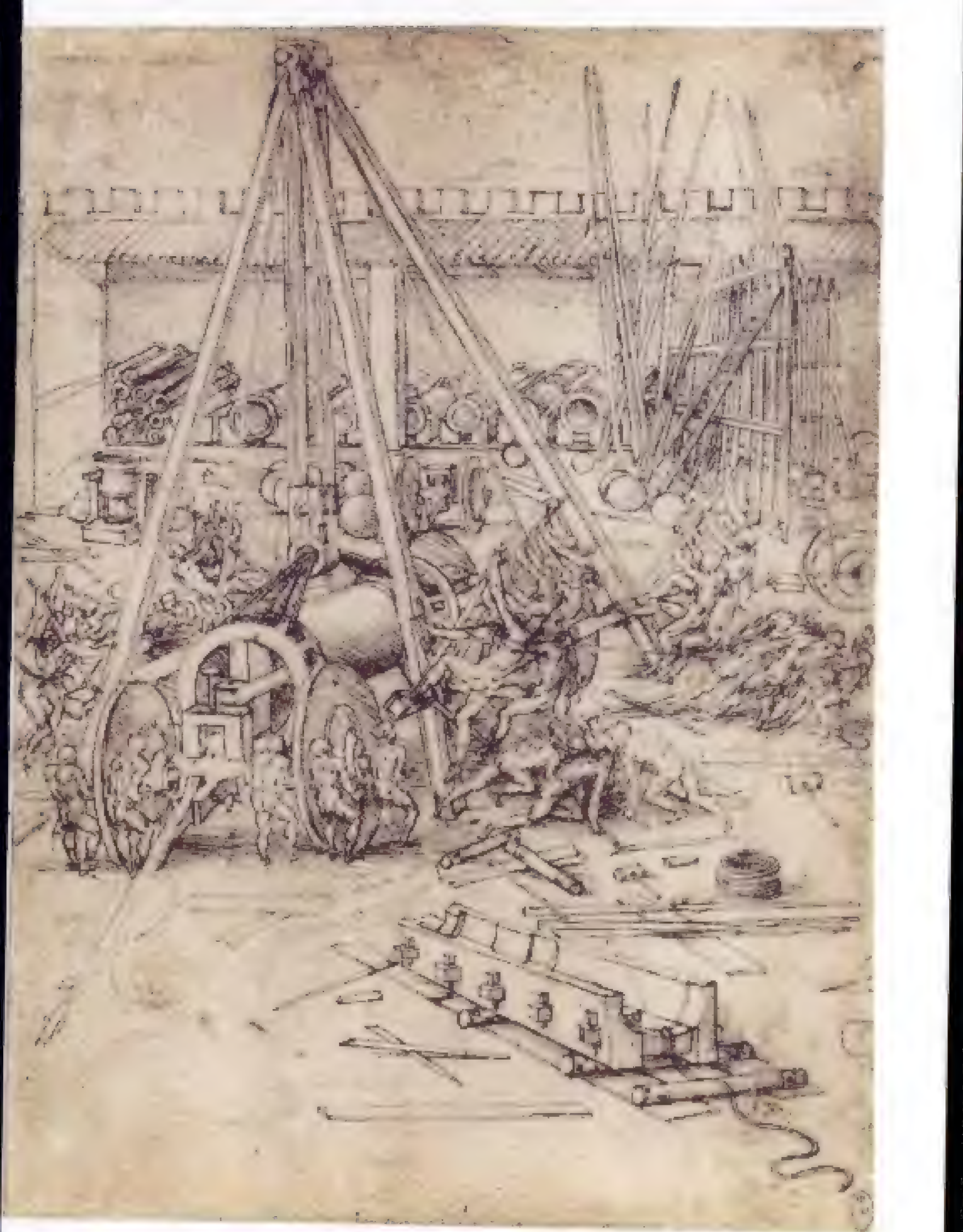
On p. 472:
Studies of naval artillery,
c. 1487-1490;
Windsor, RL 12632r.

On p. 473:
Drawings of
military machines,
1487-1490;
Windsor, RL 12647r.





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Neptune,
c. 1504;
Windsor,
RL 12570.





The manuscripts

After the death of Leonardo all of the manuscripts, in which he had recorded the research, projects, theories, personal facts, curiosities and reflections of his entire life, were inherited by his pupil Francesco Melzi, who brought them back to Italy from France. There must have been quite a large number of codices. A writer of the time recalls that Leonardo had with him in his last years “an infinity of volumes” composed by him. It is thought that the material handed down to us accounts for about one-fifth of the entire bulk of papers left by Leonardo. The rest has been lost. Melzi scrupulously safeguarded Leonardo’s heritage, dedicating himself to selecting from it the texts used to compile the *Libro di Pittura* (*Book on Painting*) but after his death, in 1570, his son Orazio was the cause, through his negligence, of the dispersion of all of the manuscripts, which were subjected to theft, sale, donation, appropriation and loss.

Anonymous,
Presumed portrait of Leonardo,
18th century;
Florence, Galleria degli Uffizi.

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Studies on facilitating fusion,
1487-1490;
Milan, Trivulziano, f. 17r.

On p. 490:
Architectural drawing,
1487-1490;
Milan, Trivulziano, f. 22r.

On p. 491:
*Drawings linked to studies
for the Duomo of Milan,*
1487-1490;
Milan, Trivulziano, f. 22v.

On p. 492:
*Figure of a building
and its details,*
1487-1490;
Milan, Trivulziano, f. 27v.

On p. 493:
Draped male figure,
1487-1490;
Milan, Trivulziano, f. 28r.

On p. 494:
Lexicon lists,,
1487-1490;
Milan, Trivulziano, f. 37v.

On p. 495:
*Pen and ink drawing
of head of an old man,*
1487-1490;
Milan, Trivulziano, f. 38r.

On p. 496:
Figures of caltrops,
1487-1490;
Milan, Trivulziano, f. 53v.

On p. 497:
Drawing of a crossbow,
1487-1490;
Milan, Trivulziano, f. 54r.

मन्त्रः नमो भगवते वासुदेवाय

תהיה לך חן וחסד
 ורחמים רבים
 וחסד רב
 וחסד רב

1929-30

1. Die erste Art ist diejenige, welche
 durch die Wirkung der Natur entsteht.
 2. Die zweite Art ist diejenige, welche
 durch die Wirkung der Kunst entsteht.
 3. Die dritte Art ist diejenige, welche
 durch die Wirkung der Götter entsteht.
 4. Die vierte Art ist diejenige, welche
 durch die Wirkung der Dämonen entsteht.
 5. Die fünfte Art ist diejenige, welche
 durch die Wirkung der Menschen entsteht.

24 11 1891

[illegible]

Handwritten text at the bottom of the page, likely a signature or date, is illegible due to the image quality.

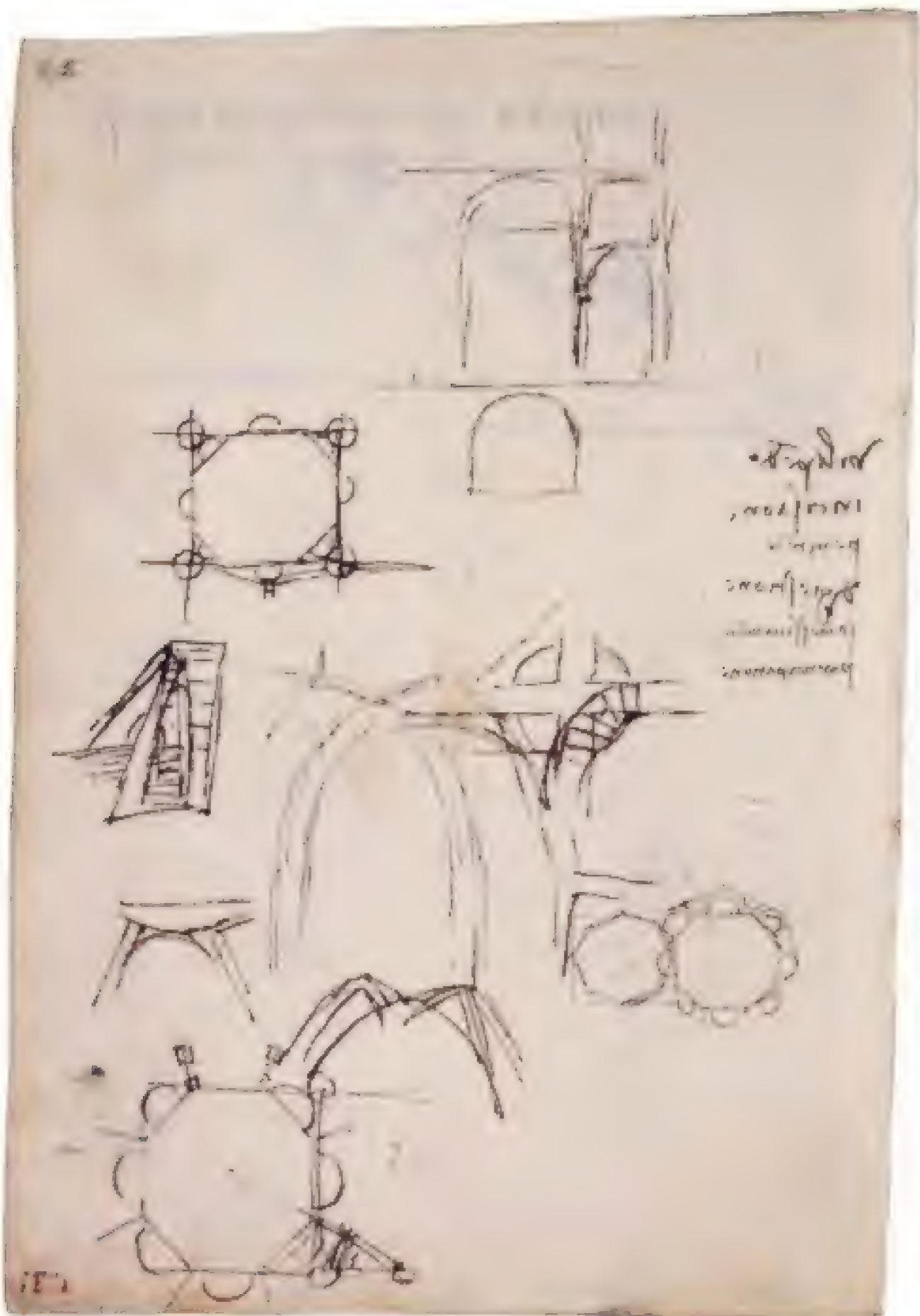
1. *Handwritten text, likely bleed-through from the reverse side of the page.*

1872

[Faint handwritten notes at the bottom of the page]



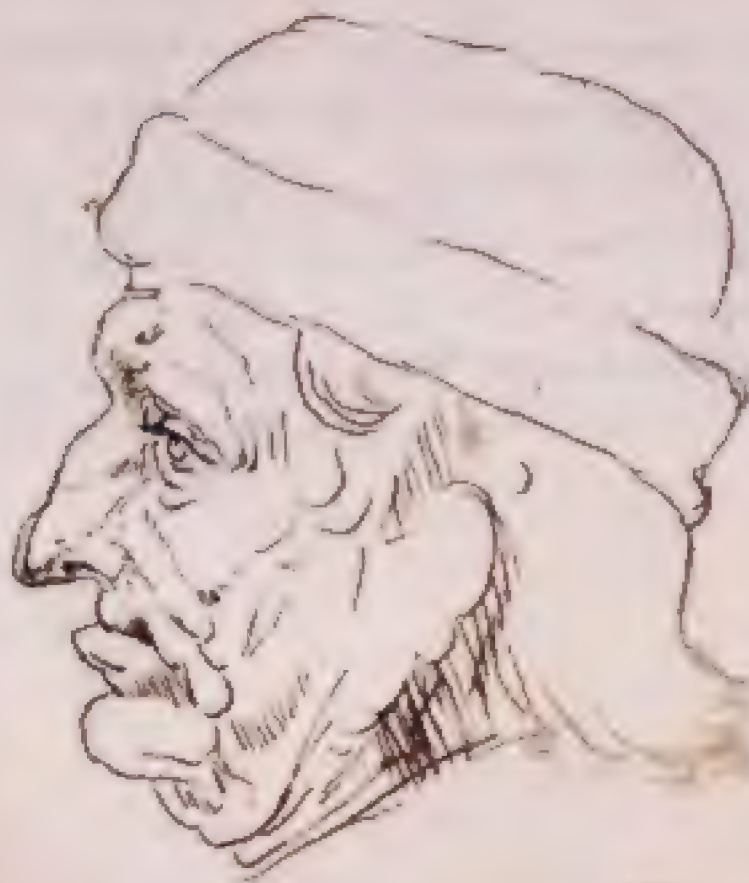
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[The page contains dense handwritten text in a cursive script, likely from a manuscript. The text is organized into several columns, with some lines starting with large initial letters or symbols. There are also some marginal notes or corrections visible.]

38
73
Handwritten text in a script, possibly Hebrew or Arabic, located at the top of the page.



Handwritten text in a script, possibly Hebrew or Arabic, located to the right of the drawing.



Handwritten text in a cursive script, likely a continuation of the text from the previous page.

Handwritten text in a cursive script, likely a continuation of the text from the previous page.

Handwritten text in a cursive script, likely a continuation of the text from the previous page.

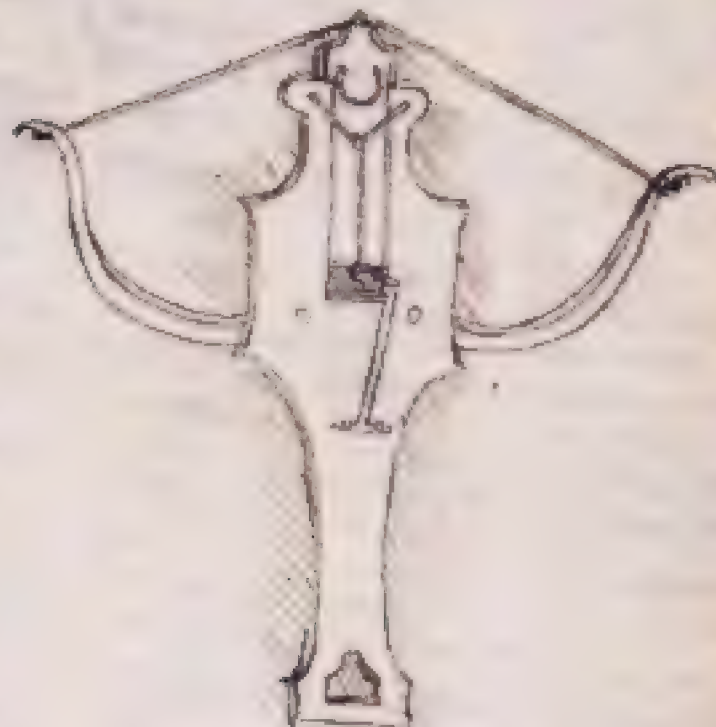
Handwritten text in a cursive script, likely a continuation of the text from the previous page.

Handwritten text at the bottom left of the page.

Handwritten text at the bottom center of the page.

Handwritten text at the bottom right of the page.

91. 54



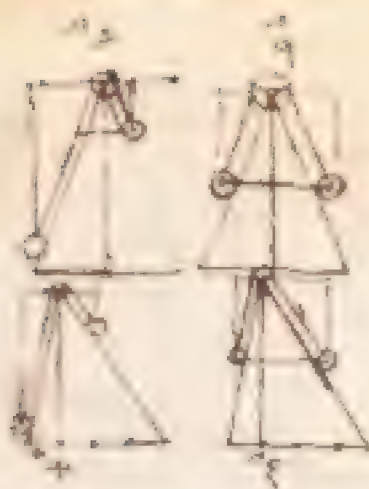
CODEx ON THE FLIGHT OF BIRDS

Turin,
Biblioteca Reale

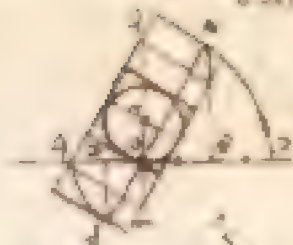
This codex is entirely dedicated to the subject of flight. The notes refer to the direct observation of birds by Leonardo, who analyzed their manner of using their wings and leaning into the wind to exploit currents of air. Formed of 17 sheets, 21 x 15 cm, it was sewn inside the cover of the *Manuscript B* that was brought to France in the late 18th century; from there the codex was however secretly removed by Guglielmo Libri, a professor of mathematics and distinguished man of science who while carrying out an official inspection at the Institut de France appropriated several of Leonardo's papers. After various sales and transfers of ownership, the codex was donated to the Savoia family and placed in its present location. The Codex dates from the years around 1505, when Leonardo, in Florence, was designing a flying machine based on the results of his studies. As compared to flight with beating wings moved by man through the strength of his muscles, the much more plausible idea of planar flight achieved with a kind of glider was taking shape.

*Studies on the flight of birds
and red chalk drawings of a leaf.*
c. 1505;
Turin, Codex on Flight, f. 15v.

On pp. 500-501:
*Studies on static principles
often applied by Leonardo
to the study of flight*, c. 1505;
Turin, Codex on Flight, ff. 1r and 4r.



અર્થઘટકો અને અર્થઘટકો
 ૭ અને ૮ ની સમજૂતી
 અનુસાર કરવામાં આવેલી



અર્થઘટકો અને અર્થઘટકો
 ૯ અને ૧૦ ની સમજૂતી
 અનુસાર કરવામાં આવેલી



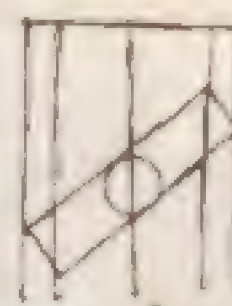
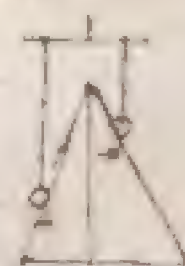
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 ૧૧ અને ૧૨ ની સમજૂતી
 અનુસાર કરવામાં આવેલી



અર્થઘટકો અને અર્થઘટકો
 ૧૩ અને ૧૪ ની સમજૂતી
 અનુસાર કરવામાં આવેલી

અર્થઘટકો અને અર્થઘટકો
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 અનુસાર કરવામાં આવેલી



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 અનુસાર કરવામાં આવેલી

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[illegible]

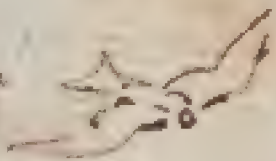
1. $\frac{1}{x^2} = x^{-2}$
 $\frac{d}{dx} x^{-2} = -2x^{-3} = -\frac{2}{x^3}$
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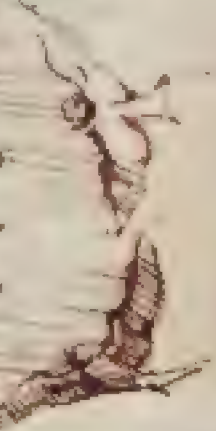
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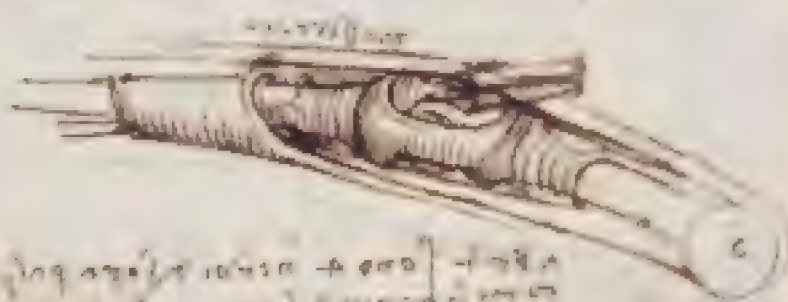
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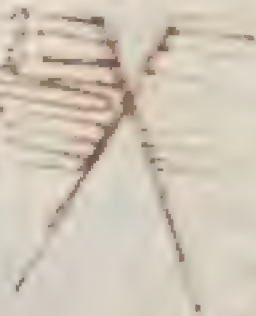
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॥ श्रीगणेशाय नमः ॥
 ॐ नमो भगवते वासुदेवाय ॥
 श्रीकृष्णार्जुनसंवादे अर्जुन उवाच ॥
 द्रुपदमुनिर्वाक्यं ब्रूयात्तत्र तदा ॥
 कुरुक्षेत्रे समवेता युयुतसः ॥
 राजा माहेन्द्र धर्मोत्तम इति ॥
 ॥ श्रीगणेशाय नमः ॥
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 श्रीकृष्णार्जुनसंवादे अर्जुन उवाच ॥
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 कुरुक्षेत्रे समवेता युयुतसः ॥
 राजा माहेन्द्र धर्मोत्तम इति ॥



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MANUSCRIPTS OF FRANCE

Paris,
Institut de France

These are twelve manuscripts, almost all of them donated by Count Galeazzo Arconati to the Biblioteca Ambrosiana in the 17th century. From that library they were removed in 1796 at the express order of Napoleon Bonaparte, then General of the French troops who had just entered Milan in triumph. The codices were taken to Paris, to the Institut de France, where they were assigned identification consisting of progressive lettering from A to M. Also taken to Paris was the *Codex Atlanticus*, which was returned in 1815 after the downfall of Napoleon, while the little codices remained definitively in France. The manuscripts have different formats, different numbers of pages, and different bindings. They are compiled in various ways, ranging from the rapid sketch to quickly jotted note, to rigorous, accurate text and drawings. As a whole, they represent the multiplicity of supports on which Leonardo recorded his observations in writing and images during the various periods of his life.

Studies on the course of water,
1490-1492;
Paris, Ms A, f. 25r.

Hidden page

Manuscript A

The format of this codex is 22 x 15 cm; of the 114 original folios there remain only 63. The missing pages were removed in the 19th century by Guglielmo Libri who ingeniously utilized, to detach them cleanly from the binding, a wire soaked in hydrochloric acid left in the volume as a bookmark. Some of the pages were put back together by Libri himself who, having fled to England, sold the new volume obtained in this way to Lord Ashburnham, along with another that he had made out of sheets removed from *Manuscript B*. This is the origin of the two codices called *Ashburnham 2038* and *2037*, which are thus formed, in reality, of parts missing from the *Manuscripts of France A* and *B*. The codex dates from 1490-1492 and is mainly devoted to subjects linked to painting and physics. It was from here that Melzi took the notes on linear perspective that he transposed to the *Libro di Pittura* (*Book on Painting*). In his studies on physics Leonardo focused mainly on motion, the central motif of his thought in painting as well: the motions of the body and the motions of the mind.

*Studies of
a human head,*

1490-1492;

Paris, Ms A, f. 63r.

On p. 514:

*Circle for constructing
polygons;
and below,*

*Method for dividing
a circle into equal parts,*

1490-1492;

Paris, Ms A, f. 11v.

On p. 515:

*Circumference divided
into equal parts;
and below, Method
for dividing a square
into eight faces,*

1490-1492;

Paris, Ms A, f. 12r.

Handwritten text at the top of the page, possibly a title or introductory notes.



Main body of handwritten text, appearing to be a detailed description or explanation related to the diagram above. The text is written in a cursive script and is somewhat faded.



*Experiment
on the falling of weights
and on movement of the air,
1490-1492;
Paris, Ms A, f. 30v.*

On p. 518:
*Method for preparing a loom
and studies on the shadow
of a person at a window,
1490-1492;
Paris, Ms A, f. 1r.*

On p. 519:
*Studies on the
movement of water,
1490-1492;
Paris, Ms A, f. 24v.*

Handwritten text in a cursive script, likely a letter or a page from a manuscript. The text is written in a dark ink on aged paper.



Handwritten text in a cursive script, continuing from the previous section. The text is written in a dark ink on aged paper.

Handwritten text in a cursive script, continuing from the previous section. The text is written in a dark ink on aged paper.

Handwritten text in a cursive script, continuing from the previous section. The text is written in a dark ink on aged paper.



सर्वप्रथम श्री. कृष्णरावः—

[illegible]

1. The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is one of the most important and interesting in the history of science. The author discusses the various theories of the origin of life, and shows that the most plausible is the theory of spontaneous generation.

[Faint handwritten notes at the bottom of the page]

[Faint handwritten notes at the bottom of the page]

1000

[Faint handwritten notes at the bottom of the page]

[Faint, illegible text]

Handwritten text in a cursive script, likely a historical document or manuscript.

Handwritten text in a cursive script, likely a historical document or manuscript.



Handwritten text in a cursive script, likely a historical document or manuscript.

Handwritten text in a cursive script, likely a historical document or manuscript.

Manuscript B

Originally consisting of 100 sheets (approximately 23 x 16 cm), this manuscript was reduced in number by the hand of Guglielmo Libri who took away, in addition to these pages, the entire *Codex on the Flight of Birds* inserted in the manuscript. The two *Ashburnham Codices* that Libri put together with the pages he removed from *Manuscripts A* and *B* and sold in London were given back to France after lengthy negotiations, and returned to the Institut in the late 19th century. This is the earliest known manuscript by Leonardo, dating from 1487-1490. It reflects his interest in military and civil engineering, with layouts and elevations of fortifications and drawings of churches constructed around a central plan. Of crucial interest is his urban planning scheme of an ideal city where the various activities are carried out on different levels; and then his technological projects for flying machines, a submarine and an "aerial screw" that winds on itself, rising in the air like a modern helicopter.

*Method for
testing the force
of an artificial wing.*
c. 1487-1490;
Paris, Ms B, f. 88v.

On p. 522:
*Studies of churches
with central plan,
of reverberation
furnaces and of a
"sphere-instrument"
used for fabricating
burning mirrors,*

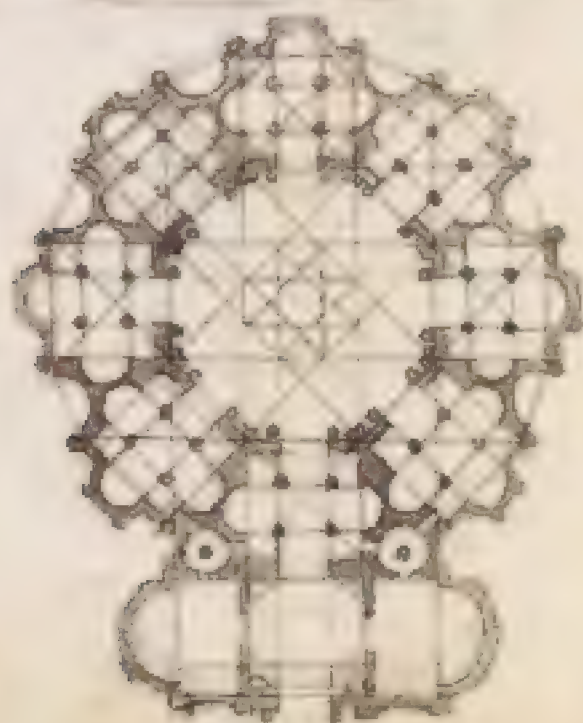
c. 1487-1490;
Paris, Ms B, f. 21v.

On p. 523:
*Study of church
with central plan,*
c. 1487-1490;
Paris, Ms B, f. 95r.

Hidden page

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ॐ नमो भगवते वासुदेवाय
 श्रीकृष्णाय नमः
 श्रीगुरुभ्यो नमः



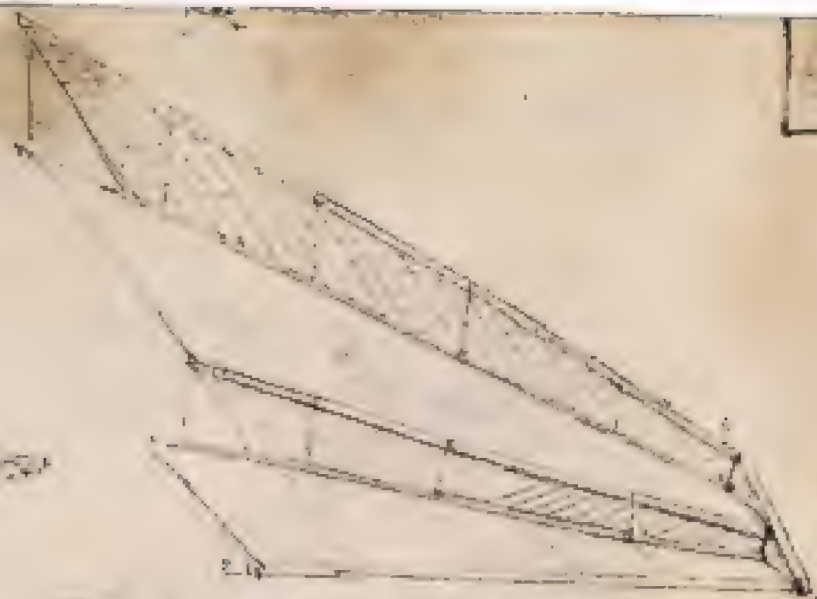
ॐ नमो भगवते वासुदेवाय
 श्रीकृष्णाय नमः
 श्रीगुरुभ्यो नमः
 ॐ नमो भगवते वासुदेवाय
 श्रीकृष्णाय नमः
 श्रीगुरुभ्यो नमः
 ॐ नमो भगवते वासुदेवाय
 श्रीकृष्णाय नमः
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 ॐ नमो भगवते वासुदेवाय
 श्रीकृष्णाय नमः
 श्रीगुरुभ्यो नमः



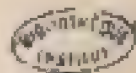
*Study of
artificial wing,*
c. 1487-1490;
Paris, Ms B, f. 74r.

On p. 526:
*Project for ornithopter
(flying machine
with wings
connected directly
to the human body),*
c. 1487-1490;
Paris, Ms B, f. 75r.

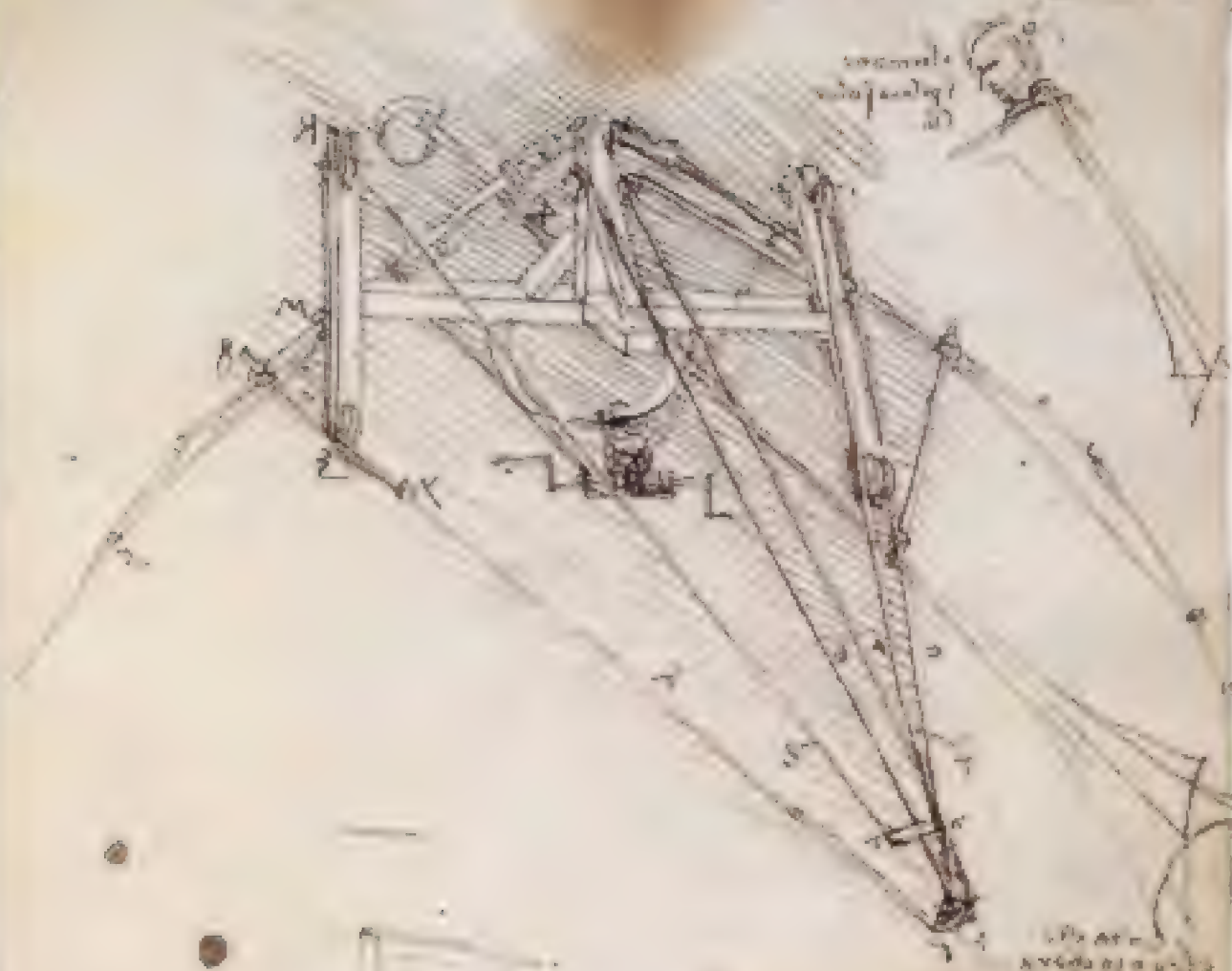
On p. 527:
*Ornithopter with pilot
in prone position,*
c. 1487-1490;
Paris, Ms B, f. 79r.



॥ ॐ नमो भगवते वासुदेवाय ॥
 ॥ श्रीगणेशाय नमः ॥



[Faint handwritten text, likely bleed-through from the reverse side.]

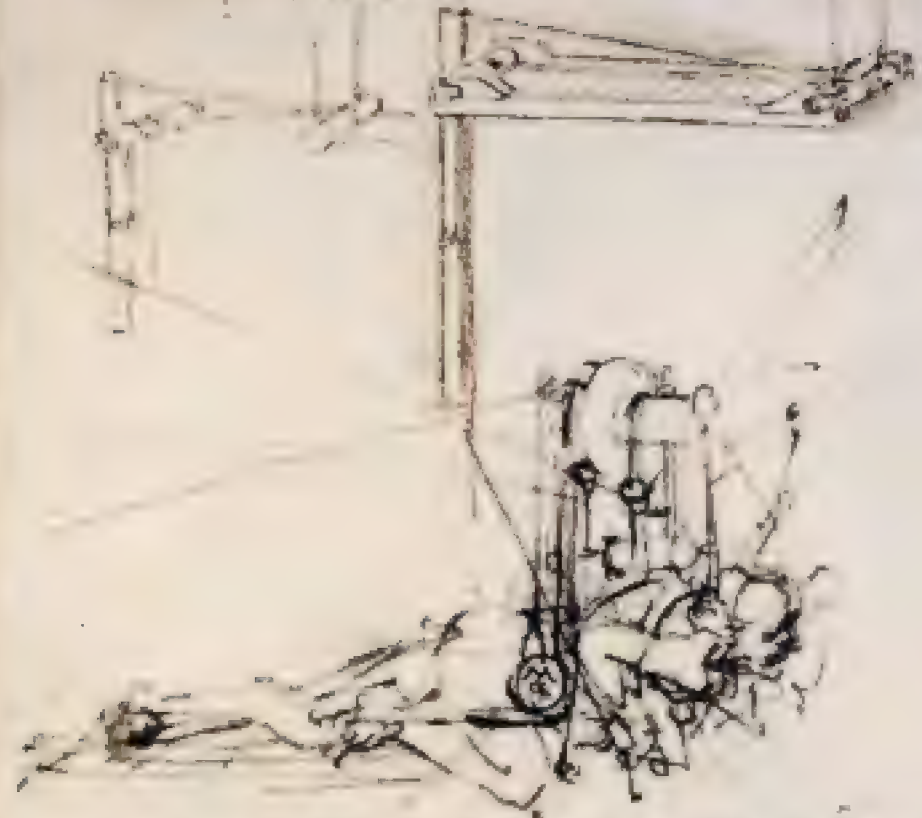


Handwritten text in German, likely a description or explanation of the mechanical device shown in the drawing. The text is written in a cursive script and is oriented vertically, matching the orientation of the drawing above it. It includes several lines of text, some of which are partially obscured by the drawing's lines.



Handwritten text at the top left, likely a title or description of the device.

79



Multiple paragraphs of handwritten text in a cursive script, likely describing the operation or components of the device shown in the drawing.

UNIVERSITY
OF CHICAGO



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Handwritten text in a cursive script, likely a description of the mechanical device shown in the drawing.

Handwritten text on the left side of the drawing, possibly a label or a note.

Handwritten text in a small oval shape, possibly a signature or a date.

Handwritten text in the middle left area, possibly a label or a note.



Handwritten text at the bottom of the page, possibly a continuation of the description or a conclusion.



Handwritten text in a cursive script, likely a description or title related to the mountain drawing above.

Handwritten text in a cursive script, possibly a list or a detailed description, located to the left of the central diagram.



Multiple paragraphs of handwritten text in a cursive script, providing a detailed description or explanation of the mechanical device shown in the diagram.



Manuscript C

This is the largest of the manuscripts of France, having a format of 31 x 22 cm and being composed of 32 sheets. Due partly to the neglect of Francesco Melzi's son, who kept Leonard's precious codices in his attic, leaving free access to them, the codex was stolen, along with others, by the tutor of the Melzi family, who later returned it to Cardinal Mazenta. Since it remained in the hands of the Mazenta family, it was one of the few manuscripts that was not purchased and taken to Spain by Pompeo Leoni. It was later offered to Cardinal Federigo Borromeo, who donated it to the Biblioteca Ambrosiana, founded by him in 1609. It thus represents the first of Leonardo's manuscripts to enter a public collection, almost four hundred years ago. The subject it deals with is *De ombra e lume* (*Of shadow and light*) that is, those optical phenomena that Leonardo first studied scientifically and then applied to his painting. On the manuscript appears the date of the *cominciamento* (commencement), 23 April 1490. Leonardo was to continue to write and draw in it for about one year.

Original binding of 'Manuscript C'.
17th century, Paris,
Bibliothèque
de l'Institut de France.

On p. 534:
*Studies on the
shadowy body,*
1490-1491;
Paris, Ms C, f. 8v.

On p. 535:
*Studies on rays
of light,*
1490-1491;
Paris, Ms C, f. 9r.

On p. 536:
*Form of shadow
dependent on lighted
and shadowy bodies,*
1490-1491;
Paris, Ms C, f. 18v.

On p. 537:
Perfect and imperfect shadow,
1490-1491;
Paris, Ms C, f. 19r.



1. The first part of the paper is a list of the names of the
 persons who have been named in the paper.

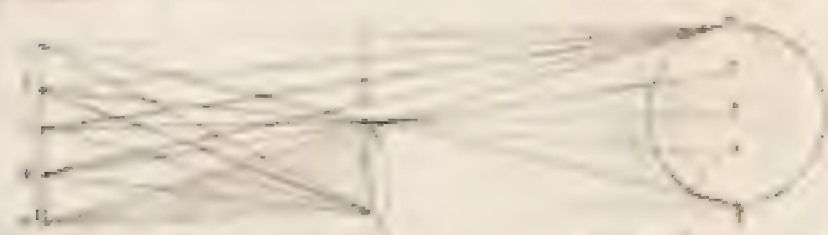


2. The second part of the paper is a list of the names of the
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5. The fifth part of the paper is a list of the names of the
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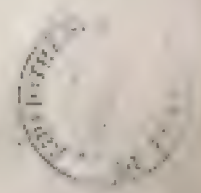


Fig. 27. A perspective drawing of a rectangular box with two circles on its front face. The circles are of different sizes and are positioned at different heights. The lines of the box and the circles converge towards a vanishing point on the right.

28



Fig. 28. A perspective drawing of a rectangular box with two lines extending from it towards a vanishing point. On the right, a vertical rectangle contains a small circle. A line connects the vanishing point to the center of the circle.

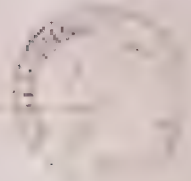


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[The page contains handwritten text in Devanagari script, which is mostly illegible due to extreme blurring and low resolution.]



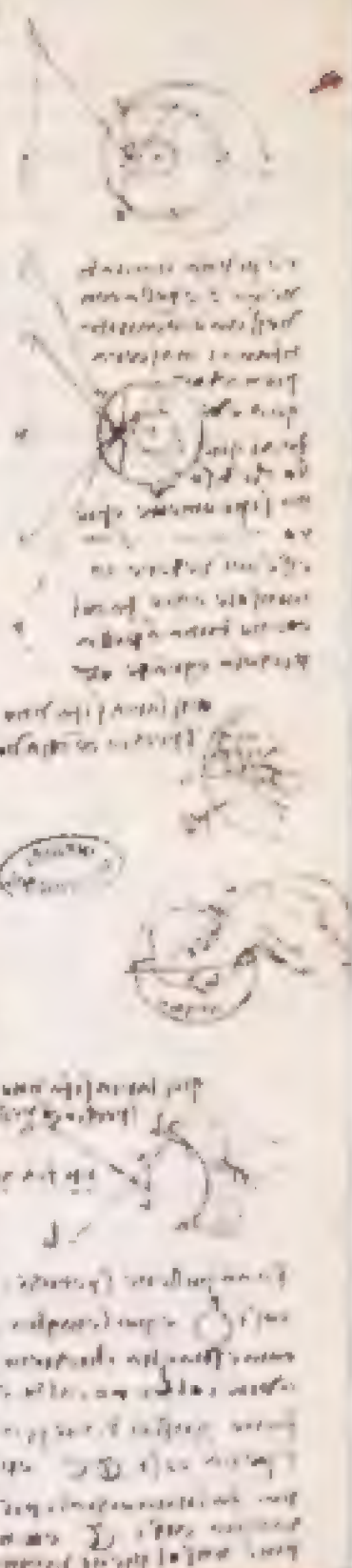
to the fact that the α and β bands are not well resolved in the spectrum.

[illegible]

1. The first part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom.

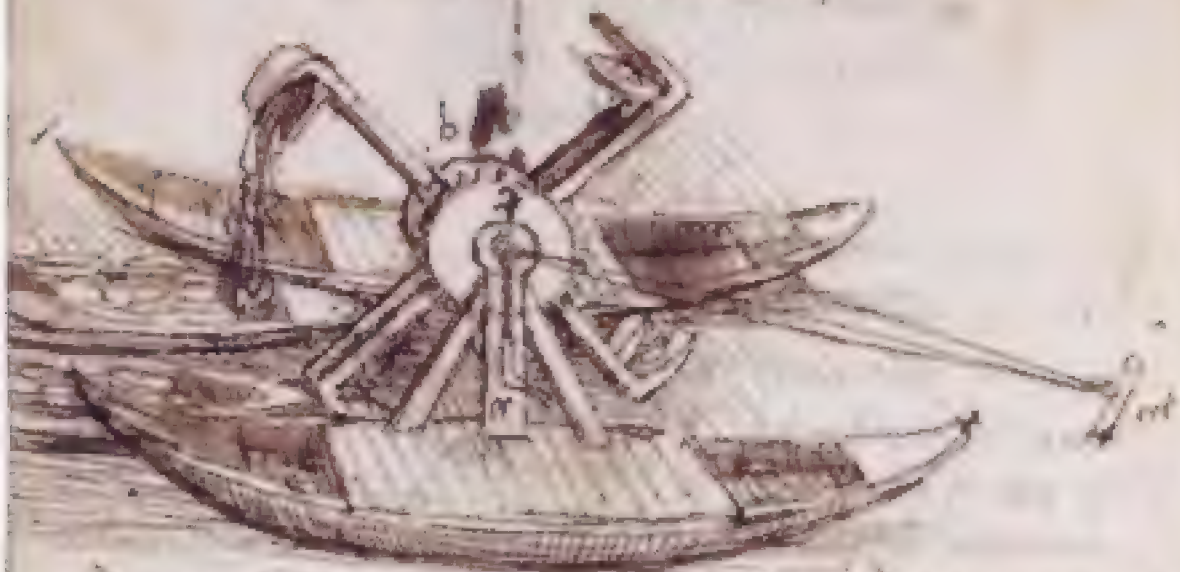
[illegible][illegible]

Main body of handwritten text, organized into several paragraphs. The script is a cursive style typical of 17th-century manuscripts. The text appears to be a detailed account or a treatise on a specific subject, possibly related to the diagrams on the right.



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Handwritten text in a cursive script, likely German, describing the mechanical device shown in the drawing. The text is arranged in several paragraphs, with some lines indented. The handwriting is somewhat faded and difficult to read in places.

Manuscript F

Composed of 96 sheets, size 14.5 x 10.5 cm, this manuscript has remained unchanged since the time when Leonardo compiled it 1508 in a very brief period (the date appearing at the beginning of the codex is September and the one at the end is October of the same year).

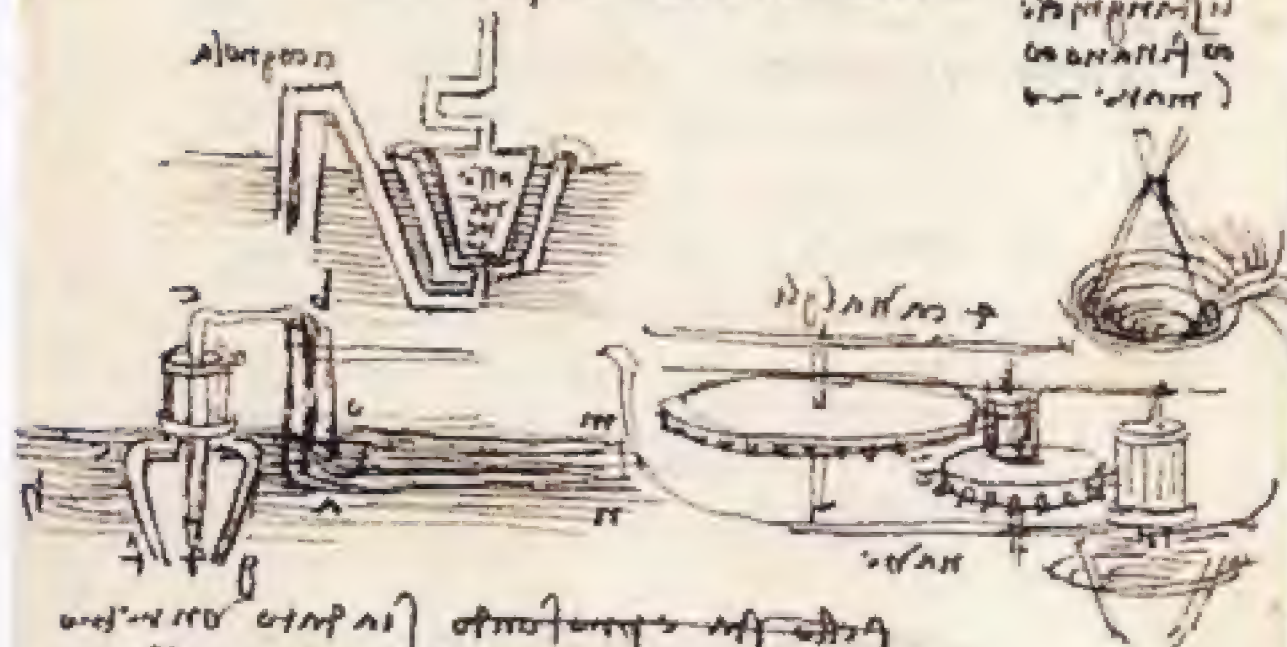
The basic subject is water, whose infinitely changing aspects Leonardo superbly describes. In his observations he examines whirlpools, waves, motion on the surface and in the depths, and coins for water the term *panniculata* (tissue-like) to define its particular aspect, similar to that of a finely wrinkled cloth. The subjects of optics and cosmology enter into the definition of the reflection of light from the sun and the moon on the surface of the sea. In regard to the earth, Leonardo hypothesizes that it originally emerged from the waters of the sea, describes the incessant mutations caused by the action of rain and wind, and lastly imagines the earth's return to the sea, sinking into its abyss.

*Study of centrifugal pump
for draining swamps,*
c. 1508;
Paris, Ms F, f. 15r.

On pp. 548-549:
Studies on water pressure,
c. 1508;
Paris, Ms F, ff. 45v and 46r.

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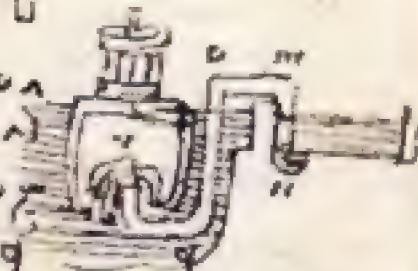
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Manuscript G

As with *Manuscripts E* and *F*, the format in octave (about 14 x 10 cm) consisted of 96 papers (here three are missing), which amounted to what was considered the “correct number” of pages. It was formed by putting together six fascicules, each composed of eight double folios. This codex contains notes on botany: the morphology of plants, laws on their birth and growth, and the effects of light, shadow, reflections and transparencies on fronds. These are studies of nature to be transposed into painting, and in fact these notes were used in the *Libro di Pittura* (*Book on Painting*). Other sections deal with recurrent subjects: geometry, flight, technology, water, optics, and motion. Leonardo here recorded the dates 1510 and 1511, during his second stay in Milan, and that of 1515, at the time when he had already settled in Rome. Here, one of his main interests was the fabrication of burning mirrors, and in this codex he develops the techniques for molding and smelting the concave plates of glass of which they were made.

*Machinery
for fabricating
concave mirrors,*

c. 1515;

Paris, Ms G, f. 83v.

On pp. 552-553:

*Studies and calculations
on parabolic mirrors
with memorandum
on using burning
mirrors for the welds*

executed in 1469

*on the copper sphere
for the lantern
of the Florence Duomo,*

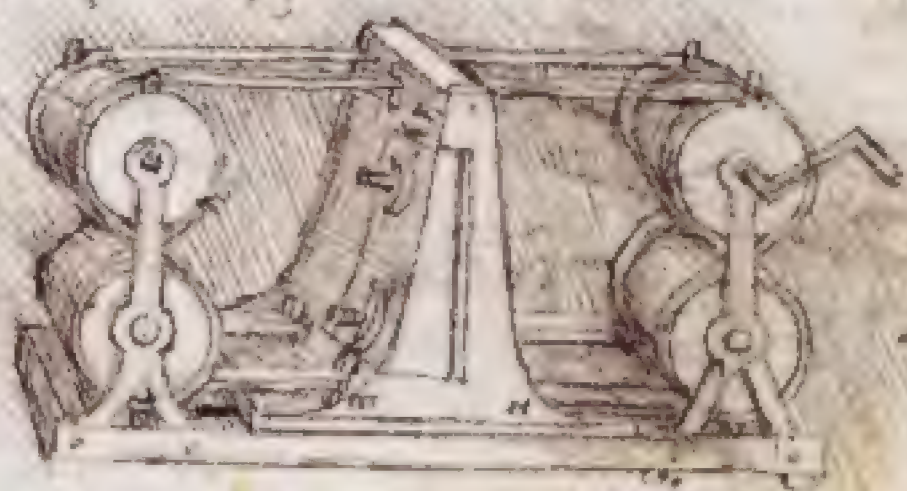
c. 1515; Paris,

Ms G, ff. 84v and 85r.

[The page contains dense handwritten text in a cursive script, likely from a manuscript. The ink is dark brown or black, and the paper appears aged and slightly discolored. The handwriting is very close together, filling most of the page area.]



Handwritten text, likely bleed-through from the reverse side of the page, appearing upside down.



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[The page contains several lines of handwritten text in a cursive script, which appears to be a continuation of the letter or a separate note.]



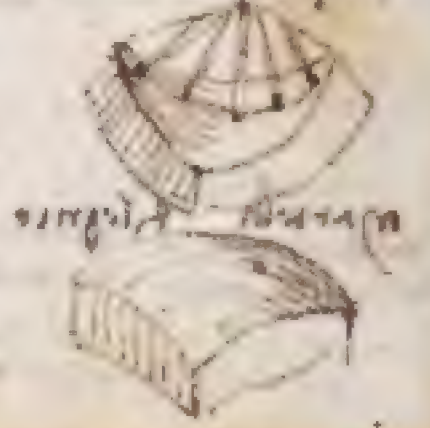
Handwritten text in a non-Latin script, likely Arabic or Persian, covering the upper left portion of the page. The text is arranged in several lines, with some words appearing to be in a different script or dialect.



Handwritten text in a non-Latin script, likely Arabic or Persian, located below the technical drawing on the right side of the page.

Handwritten text in a non-Latin script, likely Arabic or Persian, covering the lower left portion of the page. The text is arranged in several lines, with some words appearing to be in a different script or dialect.

Handwritten text in a non-Latin script, likely Arabic or Persian, located above the technical drawing on the right side of the page.



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Manuscript I

The manuscript contains a total of 139 pages belonging to two pocketsize notebooks in the 10 x 7.5 cm format. It is datable to Leonardo's last two years in Milan, from 1497 to 1499 when, just before the invasion of the French troops, he was working on the "Duchess's bathroom", for which he designed a heating system. Other notes refer to the measurements of "Leonardo's vineyard", the land he had been given by the Duke in the San Vittore district of the city. The codex contains notes and drawings on various subjects: Euclidean geometry, architecture, and the concept of motion that is common to research on both mechanics and hydraulics. As regards his studies on water, Leonardo records his intention of writing a book entirely dedicated to this subject: "Beginning of the book of water." With the allegories, the drawings of ornamental motifs also fall within that series of activities in different spheres carried out by Leonardo for Ludovico Sforza's court.

*Parchment binding
of Manuscript I,*
16th century;
Paris, Bibliothèque
de l'Institut de France.

On pp. 560-561:
*Studies of ornamental motifs
and proportions of a dog's head,*
1497-1499;
Paris, Ms I, ff. 47v and 48r.



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Handwritten text in the middle left.



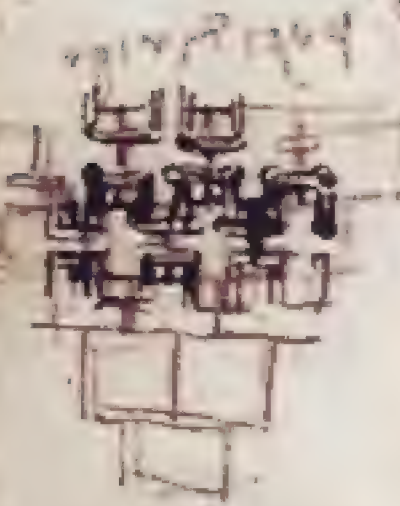
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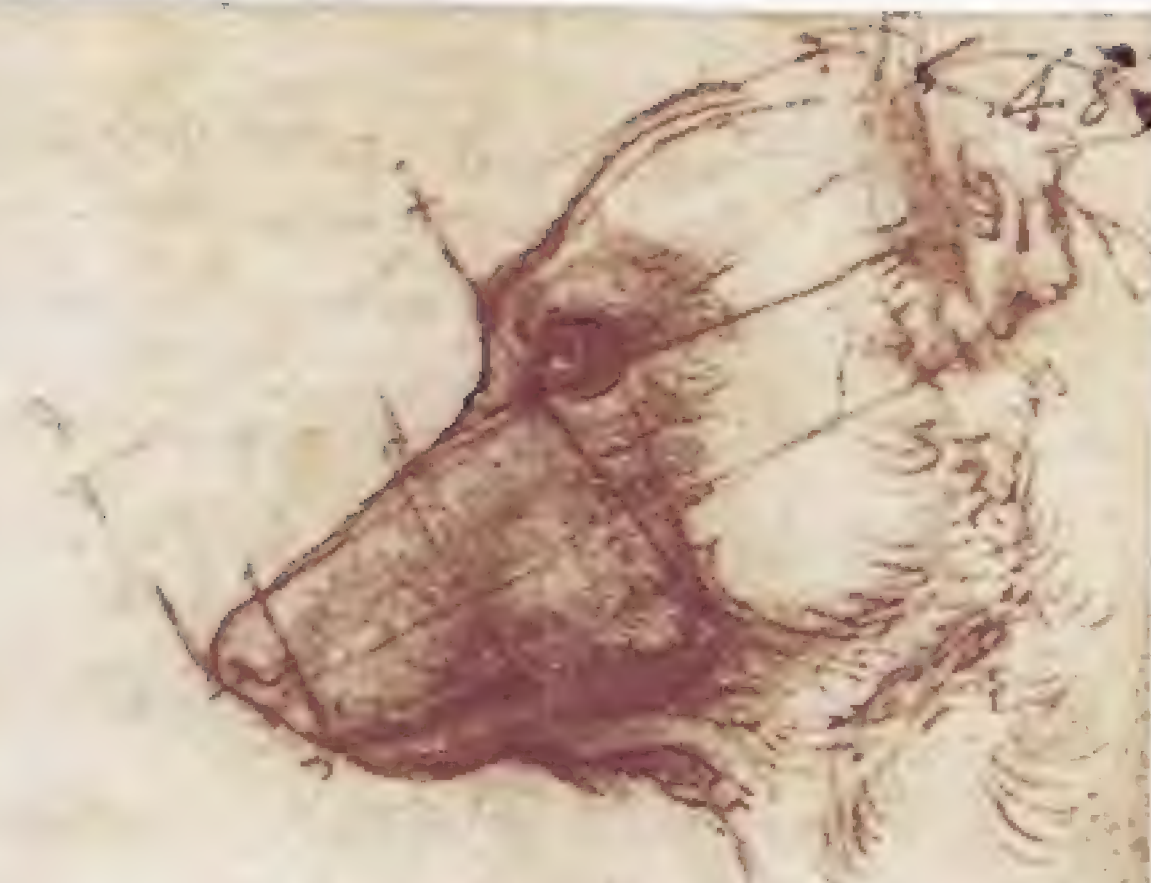
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| Incus | 1 | 2 | 0 |
| Hammer | 1 | 1 | 1 |

Manuscript K

It consists of three different manuscripts, very small in size (about 9.6 x 6.5 cm) and counting 48, 32 and 48 pages respectively. They were bound in a single small volume in the 17th century when they were in the possession of Count Orazio Archinti, who then donated the manuscript to the Biblioteca Ambrosiana. The first two notebooks belong to the same period, 1503 to 1505; the third dates instead from the years immediately following, 1506-1507. It contains notes on Euclidean geometry, such as the solution to the problem of squaring the circle, then studies on water, on flight and a drawing that rapidly sketches the dynamic pose of a horseman for the *Battle of Anghiari*. The notes also reflect research on hydraulics, architecture and comparative anatomy. At the beginning of the codex a note records a scientific query on the moon, a dense body and thus a heavy one, which appears however as if suspended in the sky. The question asked by Leonardo is intensely poetic: "The moon is dense. All dense bodies are heavy. How stays, then, the moon?"

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| <i>Binding of
'Manuscript K',
16th century;
Paris, Bibliothèque
de l'Institut de France.</i> | On pp. 564-565:
<i>Balanced scales
and notes; studies
on comparative
anatomy, 1506-1507;</i>
Paris, Ms K,
ff. 109v and 110r. | <i>stretched forward,</i>
1506-1507;
Paris, Ms K, f. 9r. |
| | On p. 566:
<i>Bird with wings</i> | On p. 567:
<i>Two figures
of a bird beating
its wing,</i>
1506-1507;
Paris, Ms K, f. 7r. |



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Manuscript L

This codex too, which is in sextodecimo (10 x 7 cm), was composed of the “correct number” of 96 folios, two of which are missing today. Leonardo compiled it in a rather long span of time starting from 1497, his last years in Milan, with notes referring to the *Last Supper*. There is an interruption after the downfall of Ludovico il Moro; the recording of notes is then resumed with numerous studies of fortifications dating from the time when Leonardo was engaged in military architecture at the service of Cesare Borgia.

Between 1502 and 1504, Leonardo brought the manuscript with him on his travels through Romagna, the Marche and then Tuscany. Other pages are dedicated to notes on arithmetic, based on Luca Pacioli's treatise, the *Summa*. A vast section deals with the flight of birds and projects for a flying machine. It is here that we find the drawing for a great single-span bridge conceived by Leonardo to unite “Pera e Gostantinopoli”.

*Original binding
of Manuscript L:*
16th century;
Paris, Bibliothèque
de l'Institut de France.

On pp. 570-571:
*Diagram of artillery
fire and military
architecture.* c. 1498;
Paris, Ms L,
ff. 45v and 46r.

On p. 572:
*Clockwork
for planetary clock,*
c. 1498;
Paris, Ms L, f. 92v.

On p. 573:
*Two figures of a young
man kneeling,*
c. 1498;
Paris, Ms L, f. 2r.

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Handwritten text in a cursive script, continuing the description or explanation of the mechanism.

Handwritten text in a cursive script, likely a concluding statement or a signature.

Handwritten text in a cursive script, likely a mix of Latin and a vernacular language, possibly Italian or Spanish. The text is written in dark ink and appears to be a list or a set of instructions.



Handwritten text in a circular stamp or seal, possibly indicating ownership or a library collection. The text is written in a cursive script and is partially obscured by the drawing.

Handwritten text in a cursive script, likely a mix of Latin and a vernacular language, possibly Italian or Spanish. The text is written in dark ink and appears to be a list or a set of instructions.

Manuscript M

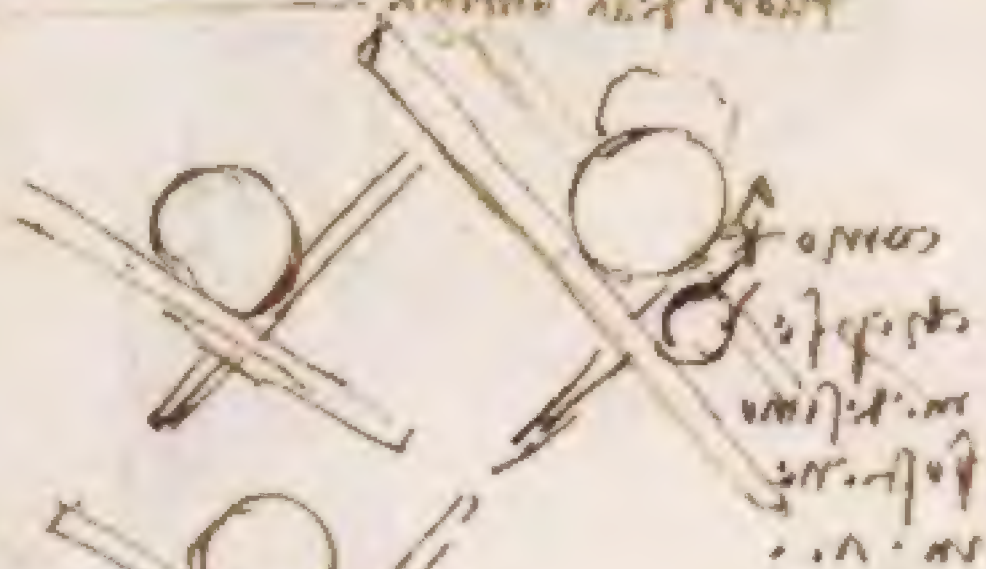
Of small format (cm 10 x 7), it contains the complete number of 96 folios. This pocket-size notebook was used starting from 1495, but the notes are concentrated mainly on the years 1499-1500 and refer in particular to the studies on geometry and physics that Leonardo investigated in relation to the classical texts. For geometry, he starts from the teachings of Euclid, mediated through those of his friend Luca Pacioli; for physics, he refers to Aristotle. Documenting the extension of his scientific knowledge, the notes also reveal Leonard's firm belief that experience is more important than the theories found in books. And so, in various spheres, Leonardo makes his contribution depend on his direct observations, in particular of the falling of weights, the falling of liquids and the resistance of the air. In this codex he also studies bridges, designs emblems and traces diagrams of growth in the branches of trees.

*Studies of column
on beams and wedge,
1499;
Paris, Ms M, f. 56v.*

On p. 576:
*Drawings of trees,
1499;
Paris, Ms M, f. 78v.*

On p. 577:
*Diagrams of trees
and part of a branch.
1499;
Paris, Ms M, f. 79r.*

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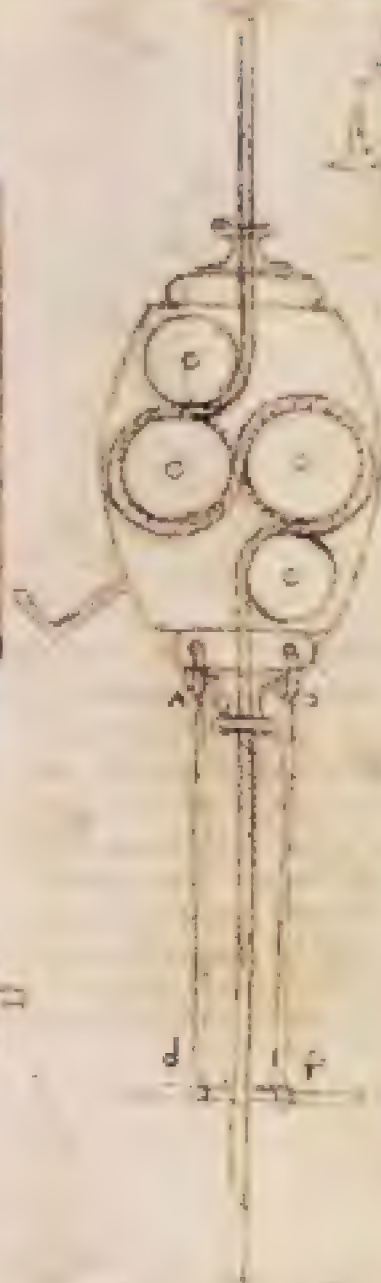
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CODICES OF MADRID

Madrid,
Biblioteca Nacional

These are two original manuscripts by Leonardo which constitute a recent and surprising rediscovery. They were found in 1966, entirely by chance, in the Biblioteca Nacional of Madrid where they had been kept for years, but all trace of them had been lost. The cause of this was an erroneous transcription of the marking, so that they no longer matched the number recorded in the inventory. Catalogued for the first time around 1830, they had been documented already two hundred years before, in Spain, in the possession of Don Juan Espina. This unexpected discovery aroused the hope that it will still be possible to find part of the rich legacy left by Leonardo which has been dispersed over the course of time, and in particular those manuscripts that were taken by Pompeo Leoni from Italy to Spain in the late 16th century. The two volumes bound in red leather were donated to the King of Spain, and were considered of great value insofar as being “rich in doctrine and curious things.”

*Studies for device
for a hand-operated
elevator,*
c. 1495-1499;
Madrid I, Ms 8937, f. 9r.

[illegible]

Handwritten text in a cursive script, likely a list or index, with several lines of text visible.

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Einige der besten
 und besten
 der besten



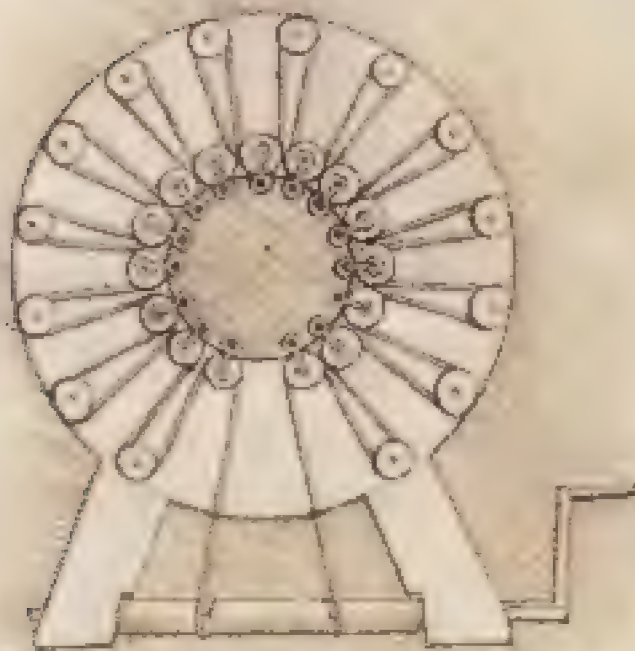
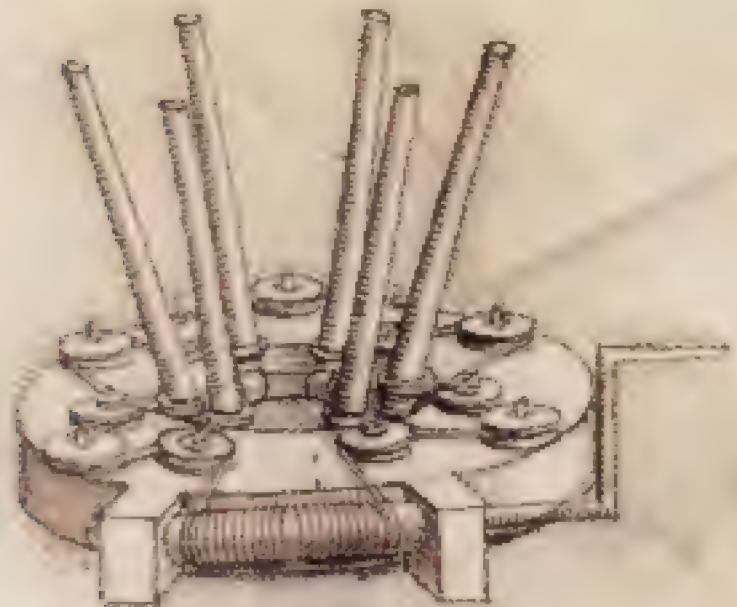
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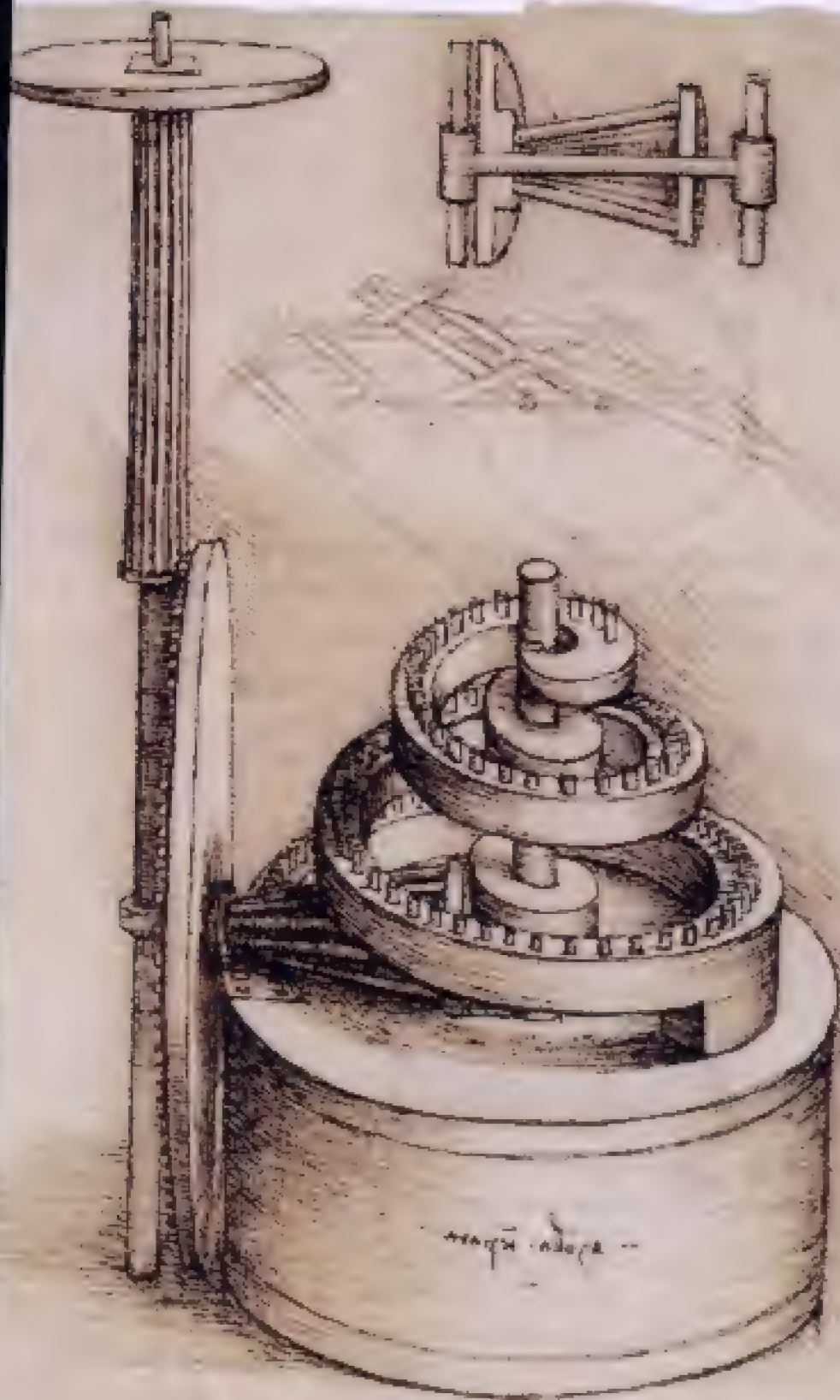
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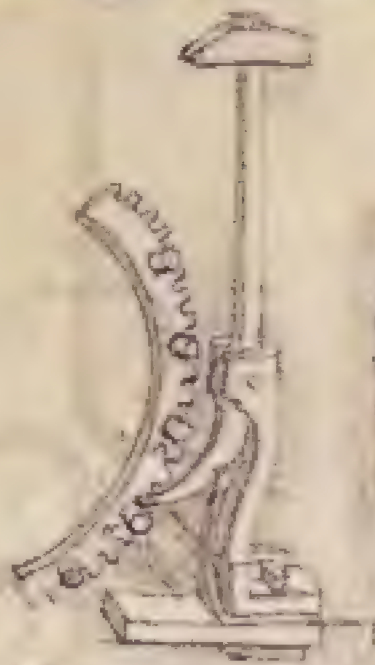
*Reverse screw
and steering wheel for cart,*
c. 1495-1499;
Madrid I, Ms 8937, f. 14r.

On pp. 588-589:
*Clock spring and device
for automatic release
of loads; set of linked chains,*
c. 1495-1499;
Madrid I, Ms 8937,
ff. 9v and 10r.

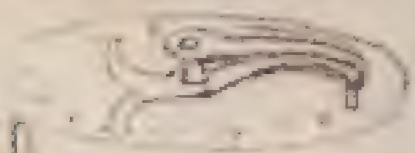
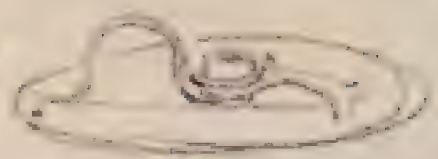
On p. 590:
*'Theater of Curius',
formed of two
mobile amphitheaters,*
c. 1495-1499;
Madrid I, Ms 8937, f. 110r.

On p. 591:
Ball bearings,
c. 1495-1499;
Madrid I, Ms 8937, f. 20v.

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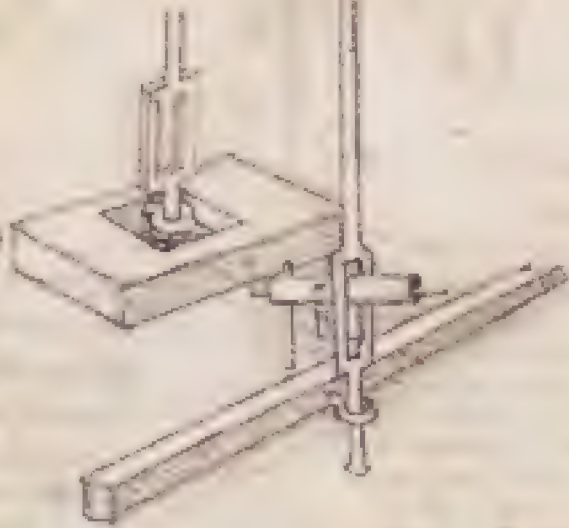
This is a description of the
 device shown in the
 preceding figure. It is
 a mechanical instrument
 used for the purpose of
 measuring the weight of
 bodies.



This is a description of the
 device shown in the
 preceding figure. It is
 a mechanical instrument
 used for the purpose of
 measuring the weight of
 bodies. The device consists
 of a vertical rod, a curved
 frame, and a small
 weight. The weight is
 attached to the end of the
 rod, and the curved frame
 is used to support the
 weight. The weight is
 then moved up and down
 the rod, and the position
 at which it comes to rest
 is used to measure the
 weight of the body.

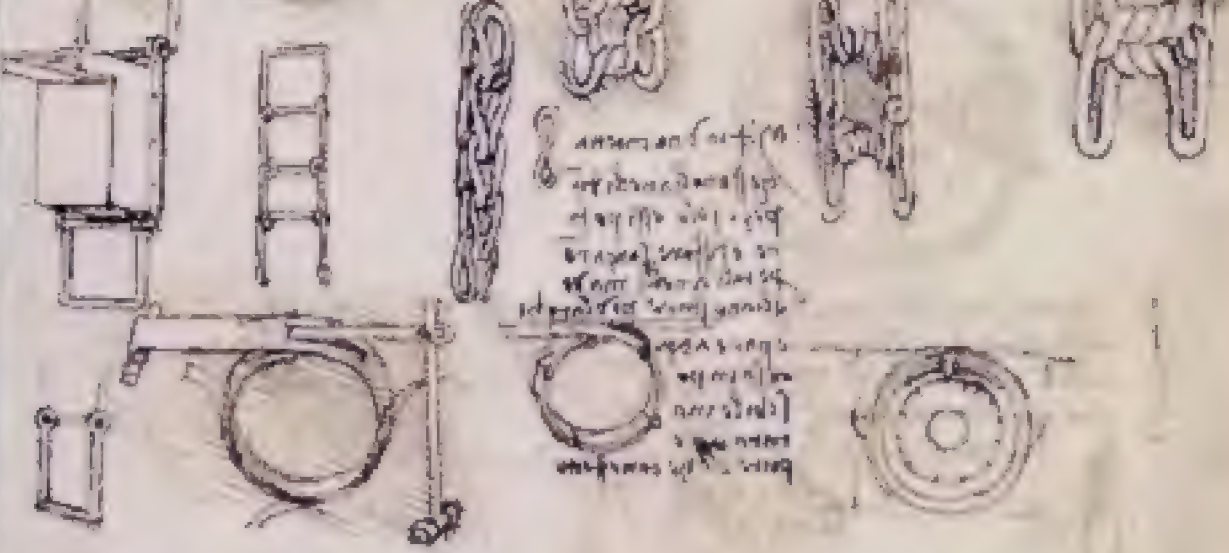
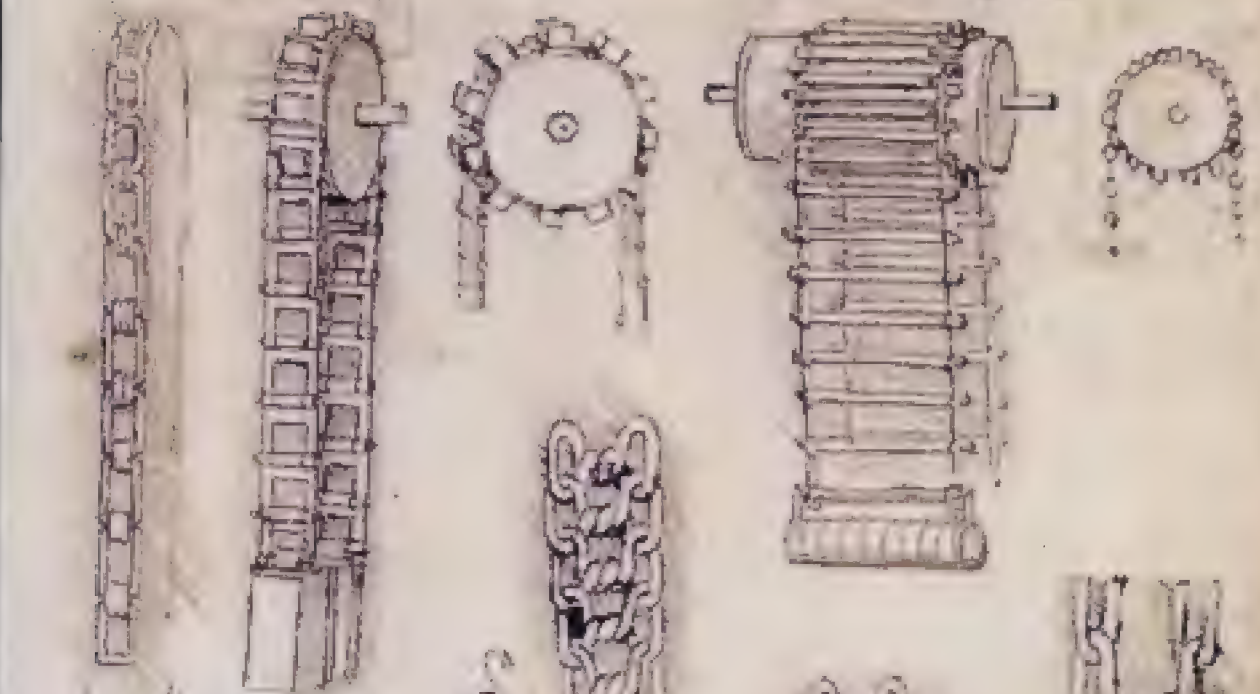


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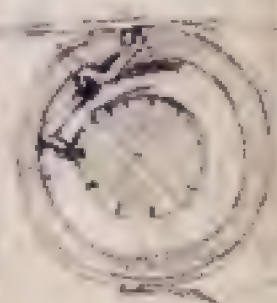
Handwritten text at the top of the page, likely a title or description of the machinery shown.



Handwritten text in the center of the page, likely a description or label for the central gear and chain components.

Handwritten text at the bottom left of the page, likely a description or label for the bottom-left gear and frame components.

Handwritten text at the bottom center of the page, likely a description or label for the bottom-center gear and frame components.



De la machine

La machine est une machine à vapeur qui sert à élever l'eau. Elle est composée d'un cylindre horizontal qui se divise en deux parties par un piston. Le piston est actionné par la vapeur qui se forme dans le cylindre. La machine est utilisée pour élever l'eau dans les mines et dans les usines.



La machine est une machine à vapeur qui sert à élever l'eau. Elle est composée d'un cylindre horizontal qui se divise en deux parties par un piston. Le piston est actionné par la vapeur qui se forme dans le cylindre. La machine est utilisée pour élever l'eau dans les mines et dans les usines.

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Handwritten text in a cursive script, likely a description of the circular diagram above it. The text is written in a single column and is somewhat faded.



Madrid II

Of the same dimensions as *Madrid I*, it is composed of two different codices for a total of 157 folios. The first was compiled in the period between 1503 and 1505 and contains significant notes on the *Battle of Anghiari*, on which Leonardo was working during those years. Also linked to Leonardo's activity for the Florentine Republic is a project for channeling the waters of the Arno river, which is reflected in the chart of Tuscany showing the course of the river from Florence down to Pisa and then to the sea. The pages also contain studies on architecture, stereometry, the waves and the flight of birds. The notes on perspective and optics were transcribed in the *Libro di Pittura* (*Book on Painting*). The last part of the volume consists of a notebook datable to 1491-1493, when Leonardo was in Milan and was engaged on the project for the equestrian monument to Francesco Sforza. The notes concern the development of techniques for fusing the colossal statue.

*Frontispiece of
Codex 'Madrid II',
1491;
Madrid, Biblioteca Nacional.*

On pp. 594-595:
*Map of Tuscany
(Valdarno),
c. 1504;
Madrid II, Ms 8936,
ff. 22v and 23r.*

*Tratados varios de Forti-
ficacion Estatica
y Geometria
Escritos en Italiano*



*Por los Años de 1491 como se
vé à la vuelta del fol. 157.*

*Advirtiendo que la Letra de este
Libro está al revés*



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Studies for fortifications,
1503-1505;
Madrid II, Ms 8936, f. 37r.

On p. 598:
Text and sketches
of figures in movement,
1503-1505;
Madrid II, Ms 8936, f. 78v.

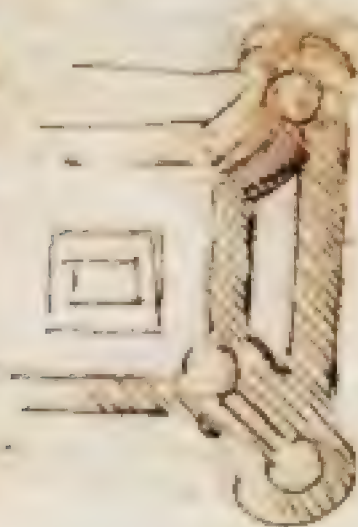
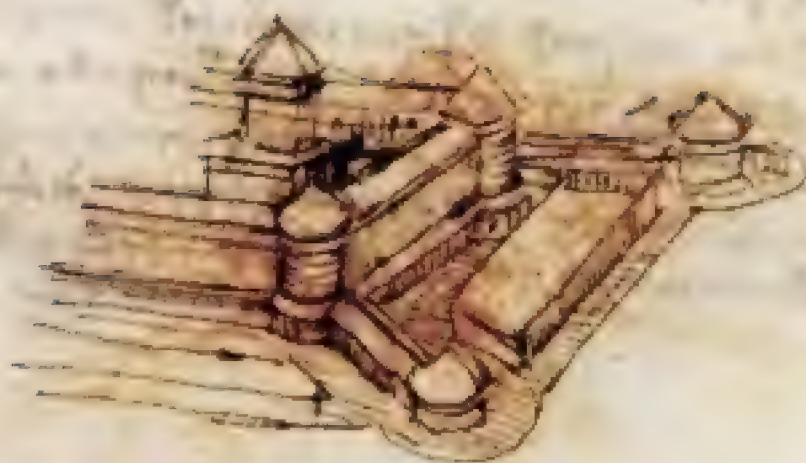
On p. 599:
Studies of fortifications,
1503-1505;
Madrid II, Ms 8936, f. 79r.

On p. 600:
Witticism and beam
tied with rope,
1503-1505;
Madrid II, Ms 8936, f. 126v.

On p. 601:
Studies of solids,
1503-1505;
Madrid II, Ms 8936, f. 127r.



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CODEx ARUNDEL

London,
British Museum

This is not a true codex but a miscellaneous collection, which however, instead of bringing together, like the *Codex Atlanticus* and the Windsor Collection, loose sheets and fragments, consists mainly of a series of fascicules that have remained intact. The sheets, of different sizes, are mainly in the format 21 x 15 cm, and number as a whole 283. The codex was probably put together by Pompeo Leoni and was purchased in Spain in the first half of the 17th century by the great English art collector Thomas Howard, Lord Arundel. His heirs donated it to the Royal Society and it was in the 19th century that it came to the British Museum. The group of fascicules covers a span of time from 1478, the years of Leonardo's youth in Florence, to 1518, the time of his old age in France. From these last years date the drawings in which Leonardo developed his project for the residence of the King of France at Romorantin, designing it as

Breathing apparatus for divers,
1508;
London, Arundel, f. 24v.

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a complex palace with gardens, fountains and an artificial lake. Francois I was later to build his new palace at Chambord. But the primary subject of the codex is mathematics, although it deals with a wide range of themes: physics, optics, astronomy as well as notes and personal memorandums. Significant is the tone of the note in which Leonardo, who was fifty-two at the time and was residing in Florence, records the event of his father's death: "On the day of 9 July 1504, a Wednesday, at the 7th hour, died Ser Piero da Vinci, notary at the Palagio del Podestà. My father, at the 7th hour. He was 80 years hold. He left 10 sons and 2 daughters."

In a series of notes Leonardo described elaborate systems for breathing underwater, but explained why he refused to divulge the details of a submarine he had designed; it was due to the "evil nature of men, who would use them for assassinations underneath the sea..."

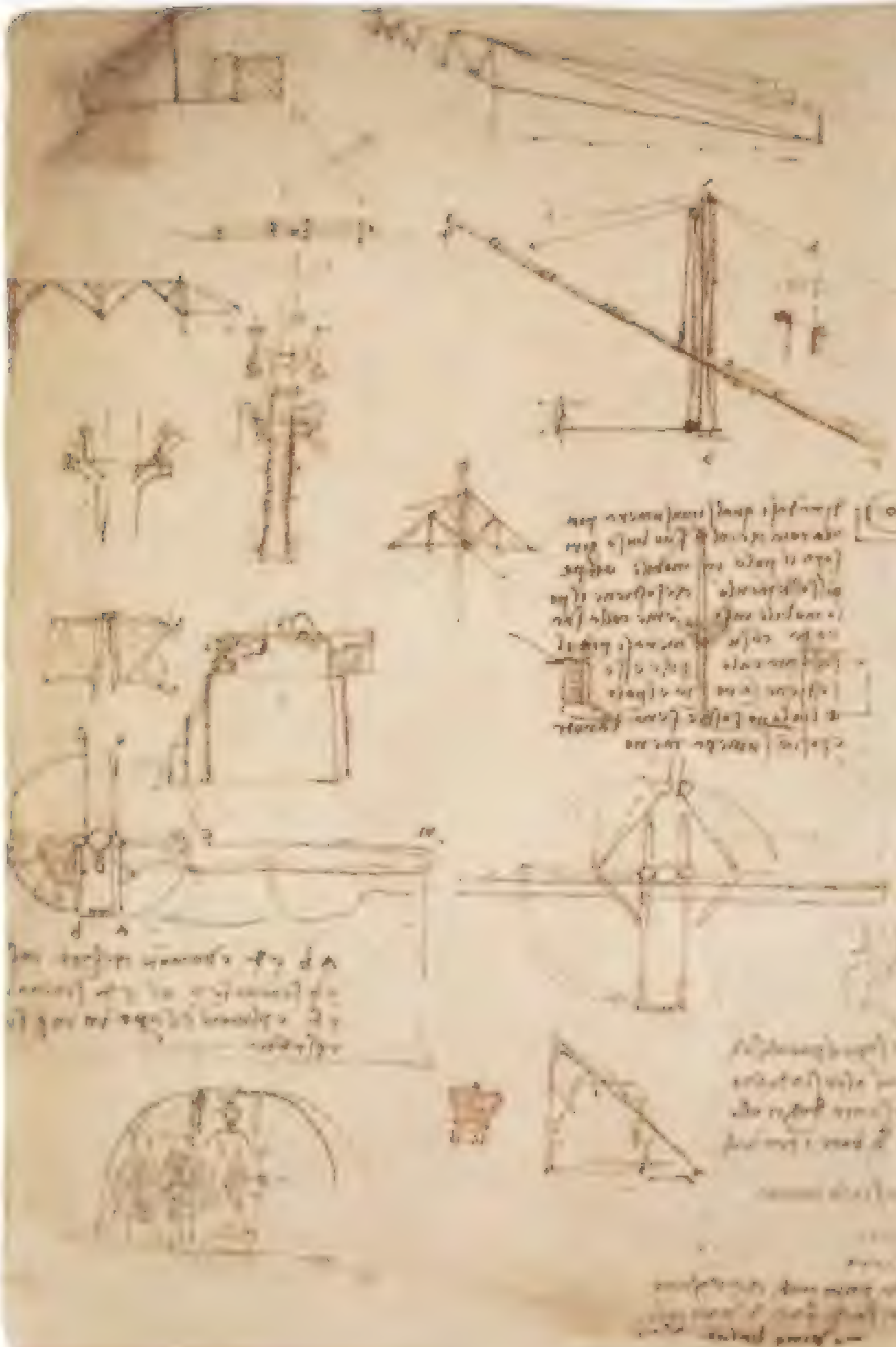
*Device for fabricating
parabolic mirrors,*
1503-1505;
London, Arundel, f. 87r.

On pp. 606-607:
*Studies for staging
Poliziano's 'Orpheus',*
c. 1506-1508;
London, Arundel,
ff. 231v and 224r.

On pp. 608-609:
Studies on shadows,
1510-1515; London,
Arundel, ff. 246v and 243r.

On pp. 610-611:
*Studies on caustics
of reflection and device
for fabricating
parabolic mirrors,*
1503-1505;
London, Arundel, ff. 86v-87r.

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In der ersten Figur ist ein rechtwinkliges
 Dreieck ABC dargestellt, in welchem
 der Winkel bei A ein rechter ist. Die
 Seiten AB und AC sind die Katheten,
 BC die Hypotenuse. Ein Punkt D
 liegt auf der Seite AC, und eine Linie
 BD ist gezogen.

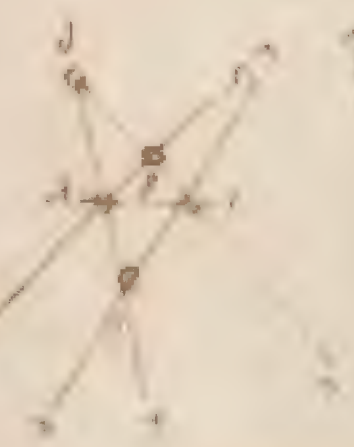
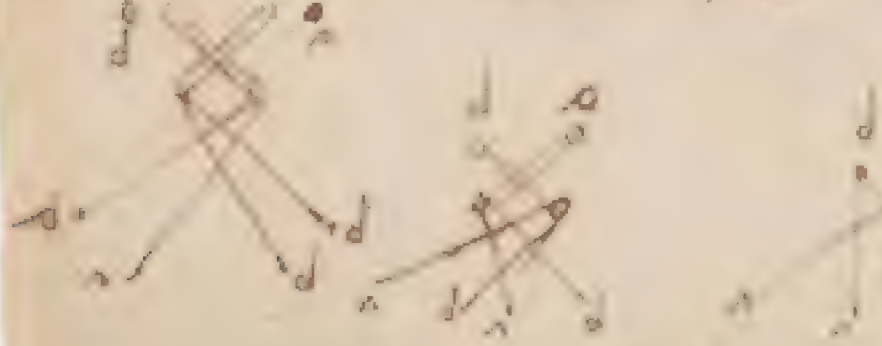
In der zweiten Figur ist ein
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 dem rechten Winkel bei A. Eine
 Linie DE ist gezogen, die die
 Seiten AB und AC in E und F
 schneidet.

In der dritten Figur ist ein
 rechtwinkliges Dreieck ABC mit
 dem rechten Winkel bei A. Eine
 Linie DE ist gezogen, die die
 Seiten AB und AC in E und F
 schneidet. Die Linie DE ist
 parallel zur Hypotenuse BC.

In der vierten Figur ist ein
 rechtwinkliges Dreieck ABC mit
 dem rechten Winkel bei A. Eine
 Linie DE ist gezogen, die die
 Seiten AB und AC in E und F
 schneidet.

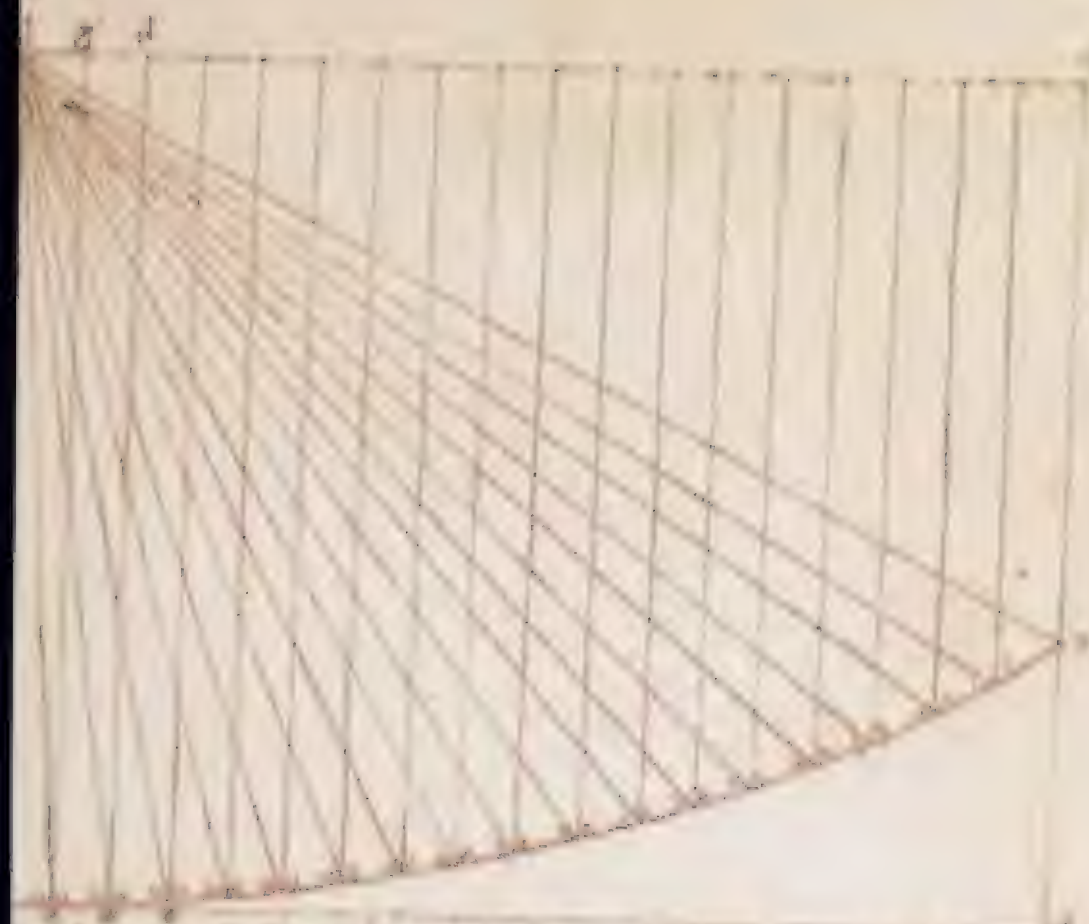
In der fünften Figur ist ein
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 dem rechten Winkel bei A. Eine
 Linie DE ist gezogen, die die
 Seiten AB und AC in E und F
 schneidet.

In der sechsten Figur ist ein
 rechtwinkliges Dreieck ABC mit
 dem rechten Winkel bei A. Eine
 Linie DE ist gezogen, die die
 Seiten AB und AC in E und F
 schneidet.



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In the first place, it is to be observed that the
 lines which are drawn from the point 'a' to the
 points on the curve, are all of equal length.
 This is evident from the fact that the lines
 are all drawn at equal angles to the horizontal
 line. The lines which are drawn from the point
 'd' to the points on the curve, are all of
 equal length. This is evident from the fact
 that the lines are all drawn at equal angles
 to the vertical line. The lines which are
 drawn from the point 'a' to the points on the
 curve, are all of equal length. This is
 evident from the fact that the lines are all
 drawn at equal angles to the horizontal line.
 The lines which are drawn from the point
 'd' to the points on the curve, are all of
 equal length. This is evident from the fact
 that the lines are all drawn at equal angles
 to the vertical line. The lines which are
 drawn from the point 'a' to the points on the
 curve, are all of equal length. This is
 evident from the fact that the lines are all
 drawn at equal angles to the horizontal line.
 The lines which are drawn from the point
 'd' to the points on the curve, are all of
 equal length. This is evident from the fact
 that the lines are all drawn at equal angles
 to the vertical line.

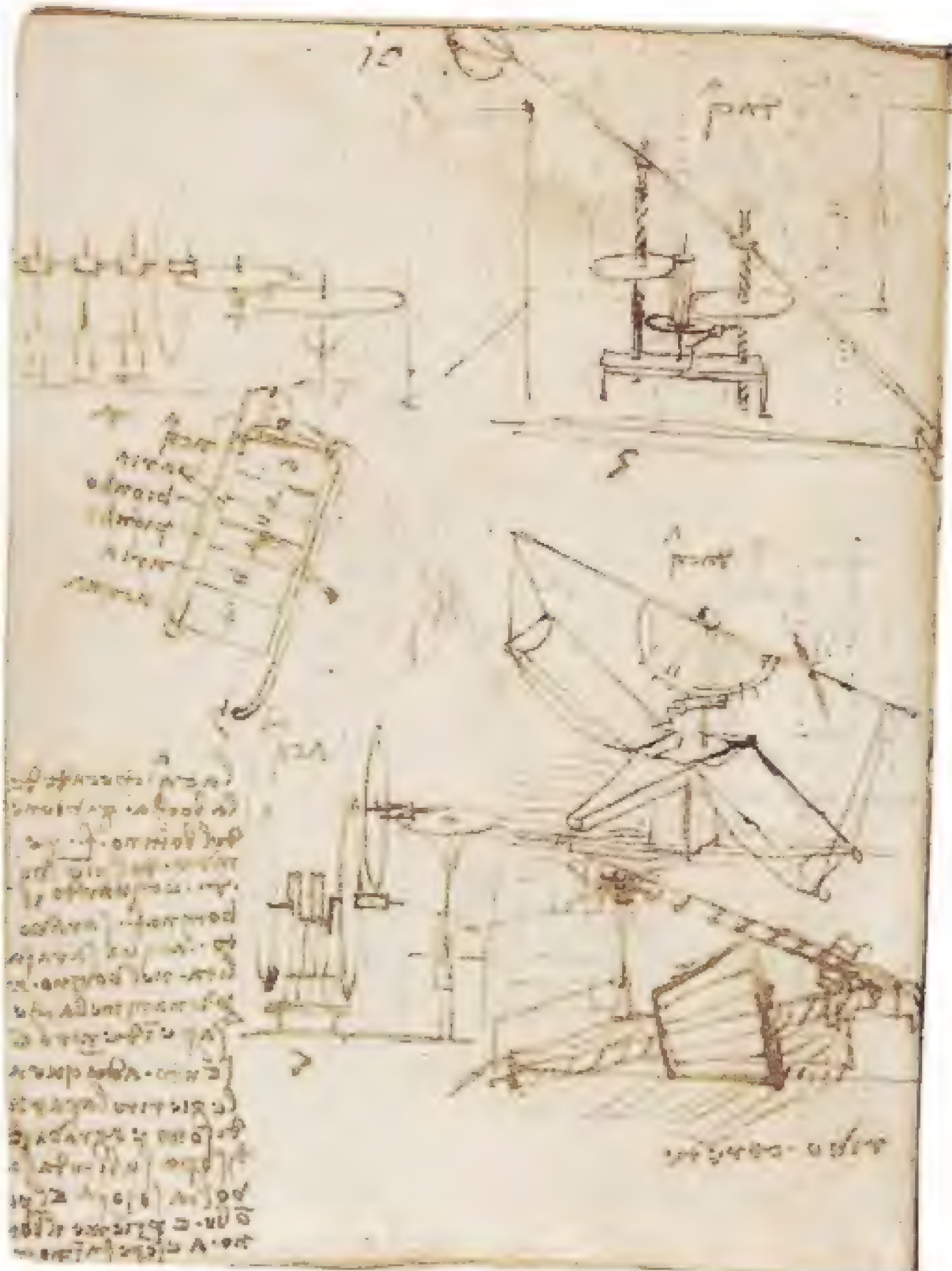
FORSTER CODICES

London,
Victoria and Albert Museum

The three *Forster Codices* are small pocket notebooks used by Leonardo at various times in his life. First owned by Pompeo Leoni, after having changed hands a number of times they were donated, in the second half of the 19th century, to the Victoria and Albert Museum in London.

Forster I consists of two manuscripts measuring about 14.5 x 10 cm. The first is datable to 1505, when Leonardo, in Florence, was entirely dedicated to studying geometry. It shows a rigorous structure and order rarely found in Leonardo's writings, and is divided into three sections: plane geometry, solid geometry and transformations of the pyramid. Leonardo was interested in stereometry, that is, the transformation "of one body into another body without decreasing or augmenting its material." The authors to whom he refers are Euclid and Luca Pacioli. The second manuscript dates from prior years, when Leonardo, in

*Mechanisms for actuating
hydraulic pumps,
c. 1487-1490;
London, Forster I, f. 45v.*



Milan, was engaged in projects of hydraulic engineering: Archimedes screws and other devices for lifting water.

Forster II is also composed of two different manuscripts. The format is very small (9.5 x 7 cm). The first manuscript, compiled in the years around 1497, contains notes on the *Last Supper*, architectural sketches of Bramante's work in Santa Maria delle Grazie and, always drawn in red chalk, motifs of intertwining plants, figures, portraits, technological and mathematical studies. The second codex dates from two years earlier. In it Leonardo carried out a series of exercises relevant to a theoretical treatise on physics, written by him but unfortunately lost.

Forster III is even smaller (9 x 6 cm) and dates from a still earlier period (1493-1496). In it Leonardo recorded notes on a vast range of subjects, which are freely intermingled and superimposed on the pages.

*Figure of a seated woman
with child in her lap,*
c. 1497;
London, *Forster II*, f. 37r.

On pp. 616-617:
Solid geometry and polyhedrons,
c. 1505;
London, *Forster I*, ff. 13r and 13v.

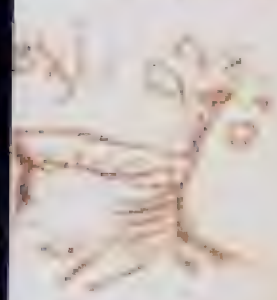
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*Pages and binding
of 'Codex Forster II',
c. 1497; London,
Victoria and Albert Museum,
ff. 62v and 63r.*

On pp. 620-621:
*Drawings of hats, ribbons and other
objects for masquerade costumes,
c. 1493-1496;
London, Forster III, ff. 8v and 9r.*

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CODEx HAMMER

Seattle,
Bill Gates Collection

This codex consists of 36 sheets (18 double sheets) measuring approximately 29.5 x 22 cm, which Leonardo compiled mainly in the years from 1504 to 1506, with some sheets added up to 1510, according to a principle that consisted of filling each of the double sheets separately and keeping them one within another as unbound units. It is not known whether Leonardo himself decided to put them together in the form of a bound volume; however, in recent times the sheets have been disassembled and are now kept loose as they were in the original state. It is also known as the *Codex Leicester*, from the name of the former owner who purchased it in Italy in the early 18th century. It was kept at the Leicester residence in England until 1980, when it was sold at auction to the American oil magnate Armand Hammer. Then in 1994 it was sold at auction again, and was purchased by Bill Gates, the present owner, for 30 million dollars. In this codex, dedicated to the theme of the

*Studies on astronomy
and movements
of the earth's surface,
c. 1506-1508;
Seattle, Hammer, f. 1v.*

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motion of water, Leonardo investigates the various aspects of whirlpools and currents. The codex also includes astronomical studies on the illumination of the earth, the sun and the moon, with a description of the "*lumen cinereum*" of the new moon, that faint glow emitted by the part in shadow. Related to the subject of water, Leonardo's geological observations concern its erosive action, the cause of the slow but progressive changes in the surface of the earth; a series of transformations that would bring the earth to be submerged in water again as it was in the beginning, before the land emerged. For his theory Leonardo found confirmation in his discovery of fossils in the mountains, revealing the presence of the sea in primordial ages. The idea of the incessant upheaval and eternal flow of the elements is reflected in the series of *Deluge* drawings, and in the concept pervading the landscape of the *Mona Lisa*; it thus represents a profound synthesis in Leonardo's thought between the science of nature and the science of painting.

On pp. 626-627:

*Studies on astronomy
with explanation of the
"lumen cinereum" of the new moon,*
c. 1506-1508;

Seattle, Hammer, ff. 2r and 35v.

On pp. 628-629:

*Page of notes on watercourse
and drawings of obstacles
to deviate the current,*

c. 1506-1508;

Seattle, Hammer, ff. 13v and 24r.

*Experiments with siphons
of various kinds for studies
on communicating vessels,*

c. 1506-1508;

Seattle, Hammer, f. 34v.

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1. **Einleitung**
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 3. **Die Entwicklung der Sprache**
 4. **Die Funktion der Sprache**
 5. **Die Struktur der Sprache**
 6. **Die Semantik der Sprache**
 7. **Die Syntax der Sprache**
 8. **Die Phonetik der Sprache**
 9. **Die Morphologie der Sprache**
 10. **Die Orthographie der Sprache**
 11. **Die Prosodie der Sprache**
 12. **Die Pragmatik der Sprache**
 13. **Die Sociolinguistik der Sprache**
 14. **Die Psycholinguistik der Sprache**
 15. **Die Neurolinguistik der Sprache**
 16. **Die Linguistische Anthropologie**
 17. **Die Linguistische Theorie**
 18. **Die Linguistische Methodik**
 19. **Die Linguistische Didaktik**
 20. **Die Linguistische Forschung**
 21. **Die Linguistische Praxis**
 22. **Die Linguistische Ausbildung**
 23. **Die Linguistische Berufshilfe**
 24. **Die Linguistische Weiterbildung**
 25. **Die Linguistische Zusammenarbeit**
 26. **Die Linguistische Kommunikation**
 27. **Die Linguistische Interaktion**
 28. **Die Linguistische Kooperation**
 29. **Die Linguistische Konzeption**
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 31. **Die Linguistische Interpretation**
 32. **Die Linguistische Evaluation**
 33. **Die Linguistische Reflexion**
 34. **Die Linguistische Kritik**
 35. **Die Linguistische Diskussion**
 36. **Die Linguistische Debatte**
 37. **Die Linguistische Kontroverse**
 38. **Die Linguistische Streitfrage**
 39. **Die Linguistische Problemstellung**
 40. **Die Linguistische Aufgabenstellung**
 41. **Die Linguistische Zielsetzung**
 42. **Die Linguistische Handlungsanweisung**
 43. **Die Linguistische Verhaltensanweisung**
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 98. **Die Linguistische Handlungsrechtfertigung**
 99. **Die Linguistische Verhaltensrechtfertigung**
 100. **Die Linguistische Handlungsrechtfertigung**

LIBRO DI PITTURA (BOOK ON PAINTING)

Codice Urbinate lat. 1270

Vatican City, Biblioteca Apostolica Vaticana

This volume was realized by Francesco Melzi, the pupil to whom Leonardo had left in his will, along with his drawings, “each and all of the books” in his possession. Melzi, upon returning to Italy, to his villa at Vaprio d’Adda in the vicinity of Milan, had carefully safeguarded his master’s legacy for fifty years, until his death in 1570. Moreover, interpreting an intention nourished over the years by Leonardo himself but never carried out, he had selected his Master’s writings on painting in a volume that he intended to publish. But the *Libro di Pittura* was not printed immediately and in the second half of the 16th century it was divulged through incomplete manuscript copies. Only in 1651 did the first printed edition appear in Paris, under the title of *Trattato della pittura di Lionardo da Vinci* (*Treatise on painting by Lionardo da Vinci*), edited by Raphael Du

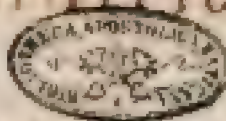
Francesco Melzi,

*First page of the ‘Libro di Pittura,
di M. Lionardo da Vinci. Pittore’.*

c. 1530-1550;

Vatican City, Biblioteca
Apostolica Vaticana.

LIBRO DI PITTURA DI M.
LIONARDO DA VINCI PITTORE.
e scrittore fiorentino



Selezione e ricerca di

Scienza è detto quel discorso mentale, il qual ha origine da
sua. alcuni principij quali in natura nell'alma con-
si pervenire per via d'una scienza, come nella geometria
si continua fare la scienza de' numeri, in quale contin-
uando dalla superficie de' corpi, si trova l'altitudine e l'ampiezza
nella linea, terminata di sopra e di sotto da due punti non continui
~~so di sopra~~
in quale per che non continui come la linea de' numeri terminata
nel punto. Al punto sopra quello, del quale si tratta, una
parte per minore. Per questo il punto è il p^o principio della geo-
metria, e di tutti gli altri, che per esso si fa in matematica, ne in
alcuna humana, che possa dare principio al pensiero, perche
non darai nel contatto finché ~~non sia~~ superficie da una altri-
ma, e di tutti della geometria si sa, quello essere creazione
del pensiero, questo non è per una linea, questo tale concetto
essere una superficie che circonda il suo mezzo, con che mez-
zo è la riproduzione del pensiero, il pensiero non è della mat-
teria, e di sopra e di sotto, ne in, ne fuori, li piani dell'anima sono
in se medesima anchor che si sono di tutti i lati, che si possono
in unire, comprendere parit alcuna d'una superficie e dar-
te che se si immaginava un altro, essere composto da molti piani
di qua di là e così alcuna parte da già conosciuta de mille si
per che molte sono che al punto da quale al suo punto equo
si riparte nel zero, uno nella cui la figura figura de la

1270. Urb.

Frèsne and printed by Jacques Langlois. The abundant scientific annexes that accompanied the work consisted of a series of engravings taken from drawings by the famous painter Nicolas Poussin. Contemporaneously, the work was also published in a French translation. This was followed by numerous editions and translations published in other countries, and the Treatise became, although always printed in abbreviated versions of the original text, the fundamental reference for the practice and theory of art. The *Libro di Pittura* is a unique document inasmuch as it transmits notes by the hand of Leonardo which Melzi transcribed also from originals that have now been lost. At the end of the volume is an index listing all of the manuscripts from which parts have been copied: "Memorandums and Notes of all of the parts of books by the hand of Leonardo which compose as a whole this book, the *Treatise on Painting*. The surprising fact is that only some of the codices indicated can be identified with known codices, as demonstration of how many documents are missing today. The *Libro di Pittura* is divided into eight sections bearing the titles: "Of poetry and painting", "Of precepts for the

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